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Communicating Agricultural Information in Remote Places: Part I

Antoinette Paris Powell

University of Kentucky, toni.greider@uky.edu

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Communicating Agricultural Information in Remote Places: Part I

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IAALD

International Association of
Agricultural Information Specialists

Proceedings of the IXth World Congress of the International Association of Agricultural Information Specialists:

Communicating Agricultural Information in Remote Places

PART I

January 23–26, 1995 • Melbourne, Australia

INTERNATIONAL ASSOCIATION OF AGRICULTURAL INFORMATION SPECIALISTS
(IAALD)

Aims of the Association

The Association was founded in 1955 to promote, internationally and nationally, the professional interests of agricultural information professionals. The word "Agricultural" shall include but shall not be limited to agriculture, forestry, agricultural engineering, fisheries, food and nutrition, agricultural industries, veterinary science, biotechnology and rural development. The IAALD membership is about 500, drawn from eighty countries. Activities include a General Assembly (at least once in five years), annual meetings of the Executive Committee and meetings of the Working Committees as occasion demands, and the issuing of publications in the field of agricultural information: bibliography, documentation, and librarianship.

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Agricultural Science Center North
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International Association of
Agricultural Information Specialists

L'Association Internationale des
Specialistes de l'Information Agricole

La Asociacion Internacional de
Especialistas en Informacion Agricola

Proceedings of the IXth World Congress of the International Association of Agricultural Information Specialists: Communicating Agricultural Information in Remote Places

PART I

Hosted by the
Agricultural Information Association for Australasia (AGRIAA)

January 23–26, 1995 • Melbourne, Australia

Edited by Antoinette Paris Powell
with the assistance of Amélie E.M. Charron

Instructions to Authors

The *Quarterly Bulletin of the International Association of Agricultural Information Specialists* (IAALD) accepts articles that are of professional interest to the broad group of IAALD members and readers of the *Quarterly Bulletin*. Articles should be of regional concern and research should be statistically valid and replicable with the results of broad applicability. Articles submitted will go through a blind review process with an independent reviewer and will be returned to the author for corrections and modifications if necessary. Manuscripts not accepted for publication will not be returned to the author. Electronic submissions are welcome if fully IBM PC compatible on either 5 1/4 inch or 3 1/2 inch diskette. Articles can be accepted unformatted in an ASCII file or in a number of word processing programs. Graphic images may also be sent electronically but the editor must be notified prior to submission to verify that the format is acceptable. Hard copy is required and should accompany the disk.

All *Quarterly Bulletin* articles are published with a specific tabular style and follow bibliographic conventions as listed in the *Chicago Manual of Style* 14th edition. References should be complete and tables should comply with the editorial style represented in the *Quarterly Bulletin*. Two copies of all articles must be submitted with an abstract in English of 150 words or less. Additional abstracts in French, Spanish or German are welcome. Articles submitted should be accompanied with the institutional affiliation and address of each author as well as a brief biography and photograph.

News in the field of bibliography and documentation of agriculture and allied subjects is welcomed. Letters to the Editor will also be published in the *Quarterly Bulletin*. These items will be accepted in English, French, German, or Spanish. News items can also be submitted electronically to the editor's address.

Please send all manuscripts by AIR MAIL directly to the Editor:

A.P. Powell
3755 Leestown Road
Lexington, KY 40511, USA.
E-mail: apowell@ca.uky.edu

A Note about Reviewing

Interested in reviewing for the *Quarterly Bulletin*? We are particularly interested in having reviewers from developing countries but would welcome anyone who is willing to donate the time. You can expect to review no more than three articles a year and must be willing to abide by the deadlines established. The goal is to give feedback to the authors or accept the article for publication as quickly as possible to make both the feedback to the authors and the issues timely.

This is an excellent way to serve both the organization and the profession without leaving your home town. If you are interested in more information or in signing up, please contact the editor at the address given on the editorial page.

I would like to thank the following people who are donating their time and talent to this process. They have worked hard on your behalf during this past year

Syed Salim Agha
KIRKHS, Dept. of Library
    and Information Science
International Islamic University
MALAYSIA

Mr. Peter Ballantyne, Librarian
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Royal Tropical Insitute
THE NETHERLANDS

Mr. John E. Woolston
CIMMYT Scientific Information
    Unit
MEXICO

Dr. Qiaoqiao Zhang
CABI
UNITED KINGDOM

Conference Overview

COMMUNICATING AGRICULTURAL INFORMATION IN REMOTE PLACES: papers presented at the IXth World Congress, January 23–26, 1995, Melbourne, Australia

PART 1 (in *Quarterly Bulletin of IAALD*, v. 41, no. 1)

Contents / Table de Matières / Tabla de Materias

From the Editor's Desk

We are pleased to offer the papers presented at the IAALD IXth World Congress held in Melbourne, Australia January 23–26, 1995. This volume is being produced for those IAALD members who could not attend the conference and for the conference attendees who had to choose between the various tracks. The publication of the proceedings was made possible by the surplus money from the IXth World Congress.

The Conference theme was communicating agricultural information in remote places and 39 papers were presented in all conference addresses and 12 concurrent sessions. This volume contains the first 19 papers presented and volume 41, no. 2 will contain the final 20 papers. There is a wide array of topics and some unique ways of delivering agricultural information. We hope that you find this an informative and inspiring issue of the *Quarterly Bulletin*.

This volume represents the work of a number of people from around the world. As with any event, the organizing of the IXth World Congress was a complicated task. Stuart Hawkins and the members of AGRIAA worked for three years to pull this conference together and then for 6 months afterwards to organize the papers and get them into electronic form. Marie-Josée Jehl, Thiendou Niang and Isolina Boto at CTA provided the French translation of the abstracts and helped with the French portion of the issue. Lynn Menéndez of the CIAT Translation Unit once again provided the Spanish Abstracts. The language enhancement is an important part of the *Quarterly Bulletin* and without the help of these people, we would not have it.

Finally, we wish to thank the authors of the papers. Their cooperation in providing the papers in a timely fashion helped us speed up the publication process of the papers. We hope that they are pleased with the format and presentation of their work.

This volume marks a major change for the *Quarterly Bulletin of IAALD*. At the IAALD Executive Committee meeting help in Melbourne, the members of the Execu-

tive Committee decided to no longer include German abstracts of the articles. This was done because most German information professionals are fluent in English and we could reduce the size of the *Quarterly Bulletin* by eliminating the German abstracts. For many years Professor Wolfrudolph Laux has done the German tranlations for IAALD. IAALD thanks Dr. Laux for his years of unselfish service to both the IAALD Executive Committee and the *Quarterly Bulletin*. Another change is that the printing and distribution have been moved to Allen Press in Kansas City, Missouri in the USA. While we were not displeased with the performance of Hobbs the Printers in the United Kingdom, we felt that consolidating the printing and distribution would reduce our costs and speed up the distribution of the *QB*.

Stuffed in this issue are additions and corrections to the *Member Guide*. Thank you to all of you who notified me of omissions and corrections. I will publish this insert as often as necessary to keep the *Member Guide* up to date. Please let me know if the information is not correct so I can issue a correction.

Thank you to all of you who took the time to answer the distribution survey. This information will allow us to assess how the new distribution service is performing. One of the major reasons for this move was to improve the distribution of the *QB* worldwide.

The next issue of the *Quarterly Bulletin of IAALD* will finish the IXth World Congress. It too will be a double issue and include the last 20 papers from the Congress. The last two issues of the year will be a typical *Quarterly Bulletin* with the usual features.

Antoinette Paris Powell
Editor **QBIAALD**
3755 Leestown Rd.
Lexington, KY 40511
Telephone: +1-606-257-2758
Fax: +1-606 323-4719
E-Mail: apowell@ca.uky.edu

Keynote Address

Communicating Agricultural Information in Remote Places

Pamela Q. J. André

ABSTRACT: The issue of communicating critical information resources to remote places will focus the discussion on the many new technologies available for information dissemination and access. Recent progress in the development of telecommunications infrastructures in the United States and around the world has made it possible to deliver information to any location with network connectivity. With such resources available, it is critical that the agricultural information community prepare itself to transition from paper-based to electronically-based information service. Policy and procedural changes will be necessary in all aspects of the information profession from acquisition through delivery. Examples from a wide range of institutions will show how the information community is responding to this opportunity and how we, in the agricultural information community, can play a leadership role in this exciting transition.

RESUMÉ: En se penchant sur la question de la diffusion de ressources d'information cruciales, les discussions vont se concentrer sur les nouvelles technologies disponibles pour accéder à l'information et la diffuser. Grâce aux progrès récents dans le développement des infrastructures de télécommunications aux Etats-Unis, il est possible de diffuser l'information vers n'importe quelle destination liée à un réseau. Avec de telles ressources disponibles, il est important que le monde de l'information agricole se prépare à la transition du service d'information sur support écrit vers un service d'information électronique. Des changements au niveau de la politique et des procédures seront nécessaires au niveau de tous les aspects de la chaîne de l'information, de l'acquisition à la diffusion. Des exemples d'un grand nombre d'institutions montrent comment le monde de l'information réagit à cette opportunité, et comment nous, dans le monde de l'information, pouvons jouer un rôle de leader dans cette transition excitante.

RESUMEN: Este trabajo sobre la comunicación de recursos críticos de información en lugares remotos se centrará en la discusión de numerosas tecnologías nuevas que están disponibles para facilitar la difusión de la información y el acceso a ella. Los avances recientes en el desarrollo de infraestructura de telecomunicaciones en los Estados Unidos y alrededor del mundo han permitido que la información se entregue en cualquier lugar que esté conectado a una estructura de redes. Con recursos disponibles de este tipo, resulta decisivo que la comunidad de información agrícola se prepare para hacer la transición de servicios de información en papel a servicios de información por medios electrónicos. También serán necesarios cambios en políticas y en procedimientos en todos los aspectos de la profesión, desde la adquisición hasta la entrega de la información. El trabajo da ejemplos de una amplia variedad de instituciones, mostrando la forma en que la comunidad de información está respondiendo a esta oportunidad y la manera en que la comunidad de información agrícola puede desempeñar un papel de liderazgo en esta apasionante transición.

I AM VERY PLEASED to be with you today to begin this meeting on "Communicating Agricultural Information in Remote Places." With my keynote remarks I hope to stimulate the thinking of this international audience by emphasizing the commonality of the agricultural issues we share globally; by emphasizing that remoteness by no means implies lack of access; and by describing in some detail the steps we can take together to improve the flow of agricultural information for all who need it.

Information is of critical importance in the changing world of agriculture. Not only is the nature of information resources changing, but the world of agriculture is in the midst of a radical transition as it moves into the information age. The emerging global economy with its emphasis on increased competition and changing consumer demands will have a significant impact on all levels of agricultural activities.

Effective access to accurate and comprehensive information will become even more critical. In fact, if we consider some recent statistics, it is clear that agriculture makes up a significant portion of the world economy. (Figures provided by USDA, Economics Research Service.)

The value of agriculture in the world in 1991 was approximately 1.19 trillion dollars; the value of agriculture in North America—including the U.S., Canada and Mexico—was 161 billion dollars; Western Europe was 157 billion dollars; and the People's Republic of China was 19.1 billion dollars. These numbers speak to the total value of agricultural goods and services from production to consumption, including land, machinery, processing, marketing, and so forth. To view agriculture from the point of view of world trade shows there is a world value of 306 billion dollars in agricultural exports.

What does this mean to us as agricultural information specialists? It means that we support agricultural activities which make up a significant portion of the global economy. It means that our efforts should not be considered only in terms of the number of questions answered, the number of photocopies made, or the number of documents delivered. It means that we need to understand and appreciate the broader commu-

nity of which we are a part; and it means that we need to understand and appreciate our own contributions to world agriculture.

AGRICULTURE.

We use the word almost without thinking, but what does it mean? As part of my consideration of the theme "Communicating Agricultural Information in Remote Places," I want to explore some definitions.

Agricultural. The definition of "agricultural" or agriculture is a loaded issue for many of us. At the U.S. Department of Agriculture (USDA) when we talk about agriculture, members of the Forest Service feel excluded. Many citizens in the United States, and, I suppose, in many of your countries, think of farmers when you mention the word. Most citizens of the U.S. do not know that approximately 60 percent of the USDA budget relates to food. Even the dictionary defines agriculture as the cultivation of land or farming. Few think of food and nutrition, marketing, biotechnology, aquaculture, rural development, plant genetics research, or any of the other dozens of topics which make up modern agriculture.

This situation identifies one of the difficulties in trying to deliver "agricultural information," remotely or otherwise. There are many who do not understand the breadth of agriculture and, hence, the breadth of services we can provide. So we are in the position of both having to define our services and then to educate our constituencies. All of our efforts to develop comprehensive collections and to provide the most efficient service will not be effectively utilized until we educate our users as to what we have. The definition of agriculture, and agricultural libraries and information centers will continue to be a challenge.

A key part of our conference theme is *remoteness;* in remote places. The term "remote" is defined in a variety of ways: "located far away; relatively distant in space;" "distant in time;" "slight or barely

discernible;" and "aloof or distant in manner."

I believe that the organizing committee had in mind the first definition, "located far away," when they were planning this meeting. That makes a great deal of sense given that we are here in Australia, which is geographically remote from much of the rest of the world. It is also true for the Southern Pacific region in general. This is very different from the countries of Europe, where the distances are much smaller.

However, I would like to suggest that some of the other definitions of "remote" can have significant bearing on the effective delivery of agricultural information. "Barely discernible or slight" implies that a lack of knowledge or understanding of the availability of information resources, regardless of geographical distance, will prohibit the effective delivery and use of needed information. Many of us know that our libraries and information centers hold many resources of great importance to solving many of the critical issues of the day. However, many of those tasked with the problem solving don't know such resources exist. Part of our goal in delivering agricultural information to remote locations is to overcome such ignorance; to more effectively educate and inform our customers, both present and future.

"Aloof or distant in manner" is another form of remoteness with the potential to influence our ability to do business. Libraries and information centers can be intimidating places to the uninitiated. I know from personal experience that the vast, almost empty entrance hall of the National Agricultural Library is not the most inviting spot for a first-time visitor. Staff attitudes, both in person and on the telephone, can communicate a distance, a remoteness, which does not elicit a sense of confidence or well-being in a potential customer. How can we provide service when a patron is so uncertain as to be unable to articulate his or her need?

And finally, the remoteness of being "distant in time." No, I am not going to give a treatise on the fourth dimension or suggest that the famous Star Trek beam can take us forward to the future to provide agricultural information. Rather, I would like to suggest that while we all exist in the late 20th century, many of us around the world are still very distant in time, whether that is reflected in our tools, our technology, our vehicles, or our social mores. Providing a 20th century solution to an 18th century problem may not be effective.

I would like to suggest that information technology is the solution to many of our problems relating to effective service to all of our "remote" customers, as well as the less remote. My experience in the last 10 years has convinced me that the evolving information technologies are one of our best hopes for providing agricultural information where it is needed, when it is needed, regardless of geographical location or other definitions of "remoteness."

Recent progress in the development of telecommunications in the United States and around the world has made it possible to deliver information to any location with network connectivity. Before you start to consider that a negative, let me give you some information on connectivity. For the last few years, international networking has come to mean Internet connectivity. The worldwide Internet is a complex, dynamic structure made up of more than 45,000 networks which connect over 3.8 million computer hosts. This is an 80 percent increase from 1 year ago and it is continuing to grow at an astounding rate. Over 70 countries are now connected; up from 62 in January 1994. Looking at geographies, the growth of Internet hosts during the third quarter of 1994 is as follows:

Latin America & Caribbean up 36% to 22,500

Western Europe up 17% to 850,000

Eastern Europe up 19% to 32,900

Middle East up 12% to 10,300

Africa up 35% to 21,000

Asia, S. Pacific & Australia up 24% to 281,000

North America up 23% to 2.6 million

With this kind of growth in a 3-month period, we should not be concerned with the lack of connectivity.

Other technological breakthroughs enabling wireless access to Internet as well as satellite linkages will ensure even more extensive global connectivity. The growth of global networking is supported and strengthened in part through the advocacy of the United States Government. In March 1994, Vice President Gore spoke to a meeting of the International Telecommunications Union in Argentina. In his remarks he asked for help in creating a global information infrastructure to bring the communities of the world together. This is indeed happening.

We all know that computer technology exists to create, maintain, and share information resources. Many of us have been using computers in our libraries for years. Now we know that networking technology exists to provide access and that the deployment of this technology is happening at an astounding rate. Given this situation, it is critical that the agricultural information community prepare itself to utilize these technologies to provide electronically-based information service. Being very deeply involved in such a transition process at the National Agricultural Library, I would like to share some of our experiences with you, as well as those of other research libraries.

As a national library, NAL is charged with the responsibility to manage information, promote standardized format, repackage information for mass distribution, and electronically mediate access to information, no matter where it resides. In mid-1992, NAL began a planning effort to identify the issues which needed to be addressed in order to move the library from a traditional paper-based service to an electronically-based service; and to continue the library's national leadership role in the production, management and dissemination of agricultural information.

This effort quickly became known as the Electronic Information Initiative with the stated purpose of "plan and implement a systematic program of managing data in electronic form." We are not the only institution grappling with this transition. The libraries of the Committee on Institutional Cooperation (CIC), an organization of 13 university libraries in the American Mid-West, are organizing themselves as a virtual electronic library. Cornell University's Mann Library recently received the ALA/Meckler Library of the Future Award for their efforts in creating an electronic library, and many other libraries have such efforts underway.

There are many issues related to such a transition. The key areas for consideration were the policies and procedures relating to the acquisition, processing, access, dissemination, and maintenance of agricultural information found in electronic journals; original texts and reproductions of printed documents disseminated on CD-ROM; and electronic research databases. Once work began it was clear that consideration had to be given to converting NAL's own publications to electronic format as well as the long-term preservation issues associated with the electronic media. One of the most important issues became the identification of actions which could be taken without additional resources or through reallocation of existing resources.

As a first cut at the process, five committees were established involving over 30 staff members. These committees provided recommendations for the changes to come. These include:

• Provide NAL staff and patrons with state-of-the-art access to electronic information, through the development of NAL's networking infrastructure.

• Make AGRICOLA available on Internet.

• Enhance NAL's access capability through the establishment of an electronic media center.

• Identify and acquire electronic information resources.

• Establish a library-wide electronic information training program.

• Develop expertise in regard to licensing, copyright, and patents.

• Initiate electronic preservation.

• Add staff and funds to carry out these recommendations.

Perhaps the most important outcome of this effort was the understanding gained by the library staff that if we are to remain a viable information organization, we must make this transition and do it as quickly as possible. This understanding has been formalized in a statement of commitment, adopted by library management, which recognizes that the changing world of information management requires that we be able to handle information in digital form; and that it is part of our responsibility to provide leadership in the world of networked agricultural information. To demonstrate this commitment, January 1, 1995, was designated as the date at which electronic form became the preferred medium for library materials.

The implications of this commitment are very broad and assume many changes within the organization. Foremost among these changes is the need to review and revise policy statements and operational procedures to enable staff to effectively handle the new formats. The collection development policy will need to reflect this commitment. Acquisitions procedures will need to reflect this commitment. Cataloging and indexing operations will need to reflect this commitment as well as document delivery procedures and reference activities. And the list can go on and on.

A second critical change is that all staff members must have access to electronic information through an internal network interfaced to the global Internet. However, connectivity will not be effective without trained staff. A library-wide training program must include microcomputer operations, telecommunications packages, Internet tools and resources, electronic media standards, and proper handling of electronic media. New expertise will be needed to deal with the complexities of licensing and copyright for electronic materials as well as developing electronic publications to replace the paper versions. The vision statement from the University of Michigan library captures the idea with the following statement. "The librarian will increasingly serve the role of "navigator" in locating, filtering, and customizing information found beyond the walls…"

Many of these changes will impact our users as well. Patrons must have access to electronic information resources, so part of our role will be to educate others in the agricultural community as to the critical nature of electronic resources. The library can provide training for electronic access to patrons on-site, but no library budget can support network connectivity to a patron's desktop. However, we can influence the move toward electronic access in our customer organization. Establishing a well-equipped media center at the library will ensure on-site access to a variety of resources, but what about those resources located on the other side of the world and not yet in computer readable form?

While the original intent of the initiative had been to focus on changes within the operations of the library, it soon became clear that providing access to agricultural information in electronic form implied broad cooperation within the agricultural community.

Broad access to global agricultural information resources requires a more systematic approach than everyone simply mounting data and

databases as resources, or skills, or whim allow. This brings me to the outreach, dissemination, and access approach for our Electronic Information Initiative, and that is characterized as the Agricultural Network Information Center.

The Agricultural Network Information Center (AGNIC) is conceptualized as a distributed discipline-oriented source of agricultural information in electronic form to be made available systematically over the expanding global information infrastructure. Growing out of a review of the agricultural information landscape to determine the nature of our future role in a distributed network of electronic information resources, the concept has evolved into a shared vision for our electronic future. This vision defines a conceptual framework for linking the resources of agricultural information service providers to improve access and disseminating while minimizing duplication.

Most recently, a group of 25 participants from 16 institutions, including the U.S. land-grant library community, the U.S. Department of Agriculture, and agricultural professional societies, the Coalition for Networked Information, plus our Canadian colleagues from Agriculture Canada met in Washington to more clearly define the services to be provided under the AgNIC umbrella.

The mission of the Agricultural Network Information Center is to facilitate and advance electronic access to people, information, and other agricultural resources for use by the public and private components of agriculture, as well as the general public. The goals include identifying and facilitating access to agriculture-related information resources; encouraging organizations to collaborate in creating and using AgNIC while retaining responsibility for their own information resources; leveraging the distributed nature of the global information infrastructure to ensure distributed responsibility for member sites; and

facilitating collaboration within the broad agricultural community.

You may find yourself asking why such a concept is necessary when the global network gives us all the opportunity to make resources available without such a structure. And that is exactly the reason! For those of you who have used the network, you know a number of things. First, you know that there are literally hundreds of resources available, from the more than 300 library catalogs, to full text and numeric databases, to information finding aids, and a variety of directories. You also know that trying to find specific information or to focus on a specific discipline is much more difficult. You also know that resources come and go; resource locations change; resource names change and there are few, if any, standardized descriptions of resources.

The intent of AgNIC is to bring the skills that we librarians have used so effectively on paper-based collections to the electronic world: resource identification, resource description, resource assessment, and resource access. Note that I have not included resource collection. In this distributed global network, what is available on library shelves is no longer the primary criteria for the information we are able to deliver to our users. Our ability to access materials regardless of physical location is much more critical.

AgNIC will enable us to provide a wide array of value added information services uniquely related to agriculture. Some of these services include:

- A distributed virtual help desk to provide on-demand service via e-mail, fax, phone, and mail.

- Distributed reference assistance to provide mediated assistance from librarians and subject area specialists.

- Agricultural resources in both electronic form and print form to be identified and made available on the network.

- Directories of electronic agricul-

tural resources to be developed which include standardized descriptive and location information.

When will this all come about? In some respects it has already begun. Many agricultural databases already exist on the network. Cornell University has mounted more than 140 data sets on agricultural statistics from USDA. Purdue University has made a water quality database, among others, available via the network. There are a wide variety of agricultural discussion groups and list serves. There is an AgNIC home page which can be accessed via the network.

There is also work in progress. Work is underway to define an AgNIC alliance agreement for potential participants. Work is underway to determine how best to link the distributed members. Work is underway to identify coordinating mechanisms at regional levels.

Perhaps the best answer to the question of when, is that the AgNIC concept has been defined and efforts are underway to make it a reality. But the better question is how will it grow to support all our needs? This is a long term activity which necessitates effort from all of us.

As I stated at the beginning, the world of agriculture is changing rapidly; agricultural issues are global issues; they impact all of us. And agricultural information is the key to global success. The fact of being in remote places need no longer mean the lack of access to global resources. The Agricultural Network Information Center concept is a global concept. It is something we can all do together. It will support all of our needs when we begin to use our collective abilities and our willingness to work cooperatively to make it happen. We have the opportunity; we have the talent; and we have the obligation to provide the leadership to ensure that the global agricultural community has the best information service in the world.

I would like to close with a quote from Russell Acoff:

"The thing to do with the future is not to forecast it, but to create it. The objective of planning should be to design a desirable future and to design ways to bring it about."

I say to you in the agricultural information community: let us work together to bring about our future.

PAMELA ANDRÉ is Director of the U.S. National Agricultural Library located in Beltsville, MD.

CONTACT ADDRESS:

Pamela Q.J. André, Director
National Agricultural Library
10301 Baltimore Blvd.
Beltsville, MD
USA
Phone: 301-504-5248
Fax: 301-504-7042
E-Mail: pandre@nalusda.gov

The Role of CTA in Disseminating Agricultural Information in ACP Countries

Thiendou Niang

ABSTRACT: This paper reviews the developmental settings of the African, Caribbean, and Pacific (ACP) countries and the challenge of agricultural information as well as the role of The Technical Centre for Agricultural and Rural Cooperation (CTA) in facilitating the availability and accessibility of information to support agricultural development in the ACP countries. It gives an account of the Centre's activities like studies, organizations of technical meetings, production and dissemination of publications and the support to agricultural information services. It also analyses the socio-cultural aspects (beliefs, languages), the technological factors that affect information dissemination and communication as well as the political and legal factors (copyrights issues) that hinder availability and accessibility of information. The paper addresses also potential areas for sustainable agricultural information activities in ACP countries: the formulation of agricultural information policies at the national and regional level, with emphasis on human resources development, collaboration and partnership, use of technologies for networking.

RESUMÉ: Cet article passe en revue le cadre du développement dans les pays d'Afrique, des Caraïbes et du Pacifique (ACP), les défis de l'information agricole ainsi que le rôle du Centre Technique de Coopération Agricole et Rurale (CTA) à faciliter l'accès à l'information afin de soutenir le développement agricole de ces pays. Il présente les activités suivantes du Centre : études, organisation de rencontres techniques, production et diffusion de publications, et soutien aux services d'information agricole. Il analyse aussi les aspects socio-culturels (croyances, langues), les facteurs technologiques qui affectent la diffusion et la communication de l'information, ainsi que les facteurs politiques et juridiques (droit d'auteur) qui entravent l'accès à l'information. Cet article se penche aussi sur les secteurs potentiels d'activités en information agricole dans les pays ACP : la formulation de politiques d'information agricole au niveau national et régional, avec une emphase sur le développement des ressources humaines, la collaboration et le partenariat, et l'utilisation des technologies pour les réseaux.

RESUMEN: Este documento revisa los ambientes de desarrollo de los países de Africa, el Caribe y el Pacífico (ACP) y el reto que representa la información agrícola. Se analiza igualmente el papel que desempeña el Centro Técnico para la Cooperación Agrícola y Rural (CTA) en el mejoramiento de la disponibilidad y de la accesibilidad de esa información para apoyar el desarrollo agrícola en estos países. Se hace un recuento de las actividades que realiza el Centro: investigación, organización de reuniones técnicas, producción y difusión de publicaciones, y actividades de apoyo a los servicios de información agrícola. El documento analiza también diversos factores que obstaculizan la disponibilidad de la información y el acceso a la misma, incluyendo aspectos socioculturales (creencias, idiomas), factores tecnológicos, y factores políticos y legales (aspectos de derechos de autor). Se trata igualmente las siguientes áreas potenciales en las cuales se pueden realizar actividades de información agrícola en los países ACP, en forma sostenida: formulación de políticas de información agrícola a nivel nacional y regional, con énfasis en el desarrollo de los recursos humanos; colaboración y coparticipación; y uso de tecnologías para la creación de redes.

Background

The African, Caribbean and Pacific (ACP) Group comprises 70 countries of which 47 are in Africa, 15 are in the Caribbean region and 8 are in the Pacific. The common characteristics of their economies are low per capita incomes, high population growth rates, rural poverty and low standards of living. Other common features include open economies, in which foreign trade accounts for about one quarter of national GNP, and heavy dependence of one or a few export commodities.

Also, these countries are facing a period of economic decline, political instability and the negative impacts of structural adjustment programmes (SAPS). The major consequences of this situation are the prevailing shortage of employment opportunities for the predominantly young and growing populations and a decline in incomes.

There is a welcome move to improve economic cooperation between the countries. In this perspective the European member states and the ACP group of countries have decided to join their efforts. This political will of partnerships for development has been confirmed by the signatories of the Lomé Convention which covers all areas of cooperation for development, including agricultural cooperation, food security and rural development, industrial development, manufacturing and processing, energy development, trade, cultural and social cooperation and regional cooperation.

Agriculture and food security have priority in the Lomé Convention. Within this context, the protection of the environment and the safeguarding of natural resources as well as their rational utilization,

constitutes major subject areas because of the contribution to the improvement of the living conditions of the population as well as the increase of the degree of self-reliance in food security.

To achieve these objectives it is necessary to improve rural productivity, especially by transfer of technologies. These technologies should be domesticated and adopted by the ACP countries who will have to integrate them into project and development programmes, research, training and extension activities.

To improve this situation, the availability and accessibility of information and its incorporation into development strategies are seen more and more as determinant of the success of agricultural development.

The Challenge of Agricultural Information

However, there are several constraints in the availability and accessibility of information in the ACP countries. The key constraint is the near absence of national and/or regional policies concerning information for agricultural development or an explicit framework for action with specifically defined responsibilities. In addition there is the inability of national or regional networks to ensure genuine exchange of information and experiences and lack of synchronisation between measures taken by individual countries, regional organisations and donor agencies. In consequence this situation led to inadequate availability of foreign currency in some countries to procure scientific and technical publications; non allocation or inadequacy of budgetary provision for the acquisition or collection of agricultural literature and regular subscriptions to periodicals and reviews. It has also led to isolation of agricultural researchers due to lack of support for attending scientific meetings, study tours and technical visits.

Finally this situation led to a lack of qualified information professionals and expertise in information and publication management, difficulties in the free flow of information, primarily because of language barriers and the low support the government gave to agricultural extension system and programmes to disseminate and communicate information at grassroots level. The situation is all the more critical because the vast majority of agricultural producers are illiterate and are operating at subsistence level.

CTA's Mission, Activities and Programmes

For all these reasons, the Lomé Convention has emphasized the importance of information as a factor in the promotion of agricultural development. The Technical Centre for Agricultural and Rural Cooperation (CTA), was established at Ede in The Netherlands in 1983. The mission of the Centre is to help ACP countries achieve greater food security by providing them with better access to information, research, training and innovations in the spheres of agricultural and rural development. The centre has set itself two major specific objectives. The first of these is to improve the availability of scientific and technical information on methods and means of promoting agricultural and rural development in the ACP States; and the second is to promote the development by the ACP States of their own capacities for the production, purchase and exchange of this kind of information.

Historical Evolution

During its start-up phase (1983–1985), CTA fulfilled its mandate under the Second Lomé Convention by seeking to demonstrate that an understanding of scientific and technical information (STI) helps increase food security, generate income and preserve natural resources. CTA set about identifying the needs of its main target groups: planners, researchers, trainers and extension workers.

On the basis of the results of an assessment of agricultural information needs of its target group, CTA has developed during the third Lomé Convention (1985–1990) pilot activities to disseminate agricultural information: studies, technical meetings, repackaging and consolidation of information as well as activities to support the development of the information infrastructures.

These activities made CTA more keenly aware of the constraints that ACP countries face in their efforts to disseminate information, including the absence of national and regional information policies. These constraints limit the effectiveness of the Centre's work.

In view of this, the fourth Lomé Convention (1990–2000) extended CTA's sphere of activity by placing particular emphasis on promoting the incorporation of information into agricultural and rural development strategies and providing ACP Countries with scientific and technical support for formulating information programmes. During the first phase of Lomé IV (1990–1994) CTA has helped create the conditions and mechanisms necessary for promoting information as an input in agricultural production, and pooling local knowledge and experimental research findings.

Products and Services

In order to fulfil its objectives CTA provides a range of services, which have been developed to meet the needs of individuals and institutions in ACP countries. CTA conducts studies on major issues of concern to the ACP countries. The "Atlas on Livestock production and potential in the Sahel" is an important example of CTA's contribution towards conserving information relevant to controlling desertification and protecting the environment. CTA also convenes seminars and other technical meetings which are important means of exchanging information as they facilitate contacts

between specialists to address problems in strategy policy and strategy development. In sponsoring the organization of the International Symposium on New Information Technologies in Agriculture, CTA objectives were to foster exchange of experiences on general information policy, bibliographic and factual databases, multimedia applications and electronic networking. CTA also supports the attendance of ACP nationals at conferences such as IAALD Congresses and has a small programme of study visits.

In pursuit of the aim to encourage the publishing of research results and extension material and handbooks, CTA has published about 600 titles, including various studies, reports, proceedings of seminars, bibliographies and directories, both in English and in French. Notable among the Centre's publication list are *Information Exchange and Networking for Agricultural Development* and the *Directory of Training Specialists in Agricultural Information.*

The Centre publishes a bi-monthly newsletter, *SPORE*, as a key element of its agricultural information strategy with its French, English and Portuguese editions having a combined print run of about 40,000. Over the years, SPORE has become closely identified with CTA and is now a leading publication in the international agricultural press. Through its co-publication service, the Centre funds the production costs, which may include paying for translations of publications and purchasing technical books at preferential rates for free distribution. In various ways, the Centre also supports periodicals and network newsletters.

A backbone of CTA's work has been the establishment of the Question and Answer Service (QAS) which has endeavoured to respond as comprehensibly and as quickly as possible to specific technical inquiries. This service has on-line access to the major databases and to partner institutions such as BDPA,

CABI, CIDARC, KIT and NRI which provide on demand specific bibliographic information, primary documents and advisory services to users. CTA also offers service to radio and audiovisual activities with the production and the dissemination of repackaged technical information on farming issues. It also supports the production of documentary films and videos on tropical agriculture, extension and reforestation.

In addition, CTA has specific projects in the field of information and documentation. To enhance self reliance in the dissemination of agricultural information, CTA developed a CD-ROM programme. A complete package of the programme includes workstation (an IBM AT computer, a laser printer and a CD-drive), the supply and installation of the hardware and basic training for the use of a microcomputer; and databases on CD-ROM such as Agricola, Agris, CAB Abstracts, KIT abstracts, and Sesame.

In 1991, CTA launched the Dissemination of Reference Books on Agriculture Project (DORA) whose aim is to supply to each benefitting centre about 500 publications to help those involved in rural development, find an appropriate solution to the socio-economic and technical problems in their countries. The Centre also runs a Selective Dissemination Information (SDI) service targeted to about 1000 senior scientists to allow them to keep abreast of the latest scientific and technical information. Its purpose is to make appropriate agricultural technologies available and to help scientists to integrate into the worldwide agricultural research community.

Finally, CTA runs a training programme on agricultural information, with emphasis on processing information, management of information services with focus on marketing aspects and microcomputer-based agricultural information management. Future development plans are laying emphasis on training of trainers.

All these services are available free of charge to institutions and individuals in the ACP-countries.

It is apparent from this review that CTA is constantly in search of an approach to products and services development taking into account the customers wants and needs as well as market changes.

Key Issues in Information Dissemination and Communication

Socio-cultural Factors – One of the most important factors that influences the accessibility of scientific and technical information in the ACP countries is that decision makers and user communities perceive information and documentation activities as secondary services and the attention they ought to get from them is limited. The consequence is the low status of information specialists (librarians, documentalists and so forth) in the civil service with low salaries and inadequate promotion opportunities. Under these conditions, information services remain fragile. Perhaps this is tied to information officers' attitude of being the guardians of collections books rather than of information disseminators. One might wonder if this perception is not also tied to the value the users attach to information they received free of charge.

Another cultural issue is that users under utilise information and data available locally in decision making, planning, monitoring, training or extension activities. Because they don't have confidence in the local information centres, users prefer to send their requests to external information sources. In some university libraries, the stealing and mutilation of books are common problems encountered because of deficiencies in users' education and orientation, and difficulties in obtaining enough reading material for the consolidation of learning.

To these may be added the language factor. Out of 70 ACP countries there are 40 English speaking

countries, 23 French speaking countries, 5 Portuguese speaking countries and 2 Spanish speaking countries. Most of the people in the first group discard literature which is not in English. The second group has a preference for literature in the French language, nevertheless they could exploit interesting documents in English while the Portuguese and the Spanish speaking countries, in the absence of adequate material in their languages use either English or French.

From a statistical analysis of bibliographical records received by scientists in Chad, Adoum Haggar, Director of the Centre National d'Appui à la Recherche (CNAR), indicated that out of 1089 records received 75% are in English, 10% in French and the rest in other languages including Chinese and Spanish. The requests for documents by researchers were influenced by the language of the text.

Technological Aspects – Access to remote databases by means of online equipment depends on the existence of an adequate telecommunication infrastructure. Such an infrastructure scarcely exists, and even where it does, the high cost of obtaining online information makes it prohibitive. CD-ROM overcomes these constraints. At an early stage, CTA saw this as a basic development issue and developed a CD-ROM programme to facilitate direct access to relevant information sources and the production of national computerized databases on agriculture in the ACP countries.

One of the major effects of the programme has been seen in Mauritius, where information derived from the CD-ROM has been packaged to satisfy farmers' needs in agricultural technologies. For example, the Food and Agricultural Research Council (FARC) prepared an advisory leaflet for farmers on growing of tissue-cultured plantlets of bananas. The leaflet contains information about cultivars, plant type, spacing, soil type and preparation, fertilization, irrigation, wind-breaks, planting techniques, plant protection, suckers and other observations. This information has been modified at a later stage in the light of results obtained from experimentation and observation plots. To support this technology transfer, FARC developed a scheme for a group of 170 farmers. The Development Bank of Mauritius funded the import and the conditioning of plants to be distributed to farmers for production and commercialization in the view of improving the living conditions of the rural population and the substitution of the local products to imported fruits. Similar experiences have been attempted for roses within the diversification programme for Mauritian agriculture.

The CTA programme has demonstrated that the CD-ROM technology could provide poorer countries with access to a wide range of current global bibliographic literature and is ideal for remote locations.

Copyright – Another major concern in implementing information programmes and activities is copyright. The current trend of data producers imposing and enforcing copyright regulations is a threat to information programmes for developing countries and could have a negative impact on its development by making them even more expensive. The current copyright position is that with very few exceptions, the content of all databases (whether online, on CD or in print) is protected by the same copyright restrictions that apply to printed publications. But the actual interpretation and application of the law in the area has been fairly vague until very recently. On 1 April 1994, Dialog gave new emphasis to copyright protection by prefixing every printed abstract with a copyright notice. It appears now that it is illegal under International Copyright Law to make and distribute multiple copies of abstracts unless one owns the rights; has the specific consent of the copyrights holder; or has paid appropriate royalties. All databases on Dialog are protected by copyright, and a significant proportion are participating in Electronic Redistribution and Archiving scheme (ERA). The actual royalties payable under the scheme are database specific, but most organisations seem to have adopted a default scale. The implementation of these regulations with database producers perspectives would heavily increase the cost of running current awareness services for developing countries.

Nevertheless, there are special provisions in the Berne Convention for Protection for Literary and Artistic Works and the Paris Convention such as "fair copying for research and training purposes" that could be used to reduce the burden on developing countries. It appears from these conventions that public libraries are eligible to make fair copies for their clients provided it is not for resale and that, as a consequence, the activities of current awareness services (photocopying of searches and items for libraries) are not impeded.

Formulating Policies to Support Information Programmes

What of the sustainability of information programmes? In 1991, in response to this question CTA has adopted an increasingly regionalized approach to its work especially through participative approach on information needs for agricultural research, training, planning and documentation. This exercise has involved users, information professionals, decision-makers and donor agencies with a view to enhancing the organisation of agricultural information and its efficient use to support agricultural development, especially in achieving food security, conservation of natural resources and generation of resources; promoting the re-conquest of the regional markets for agricultural products; and promoting exports on the international markets through an improvement in the competitiveness of agricultural products.

There are three main reasons why CTA is helping to develop regional agricultural information programmes:

• the limited availability of resources of all kinds means that it is in the interests of the ACP countries to regionalize their approach to handling technical information on agriculture by pooling existing resources and developing common services on a regional basis

• the resources of CTA can never be sufficient to satisfy agricultural information needs at the level of individual ACP countries; a regional approach may offer the most practical and realistic alternative and may assist in mobilizing additional funds

• the ACP-EU Council of Ministers is strongly advocating a regional approach (for CTA and for its sister institute CID) under Lomé 4; the Convention itself supports and encourages this. Regionalization is very high on the political agenda.

The regional approach is attractive from an African perspective for four main reasons. First, the limited resources can be utilized more efficiently, with less duplication and more sharing. Second, the regions will need to rely less on CTA and other external organizations; there should be a higher degree of self-reliance and hence better sustainability. Third, there are likely to be far better prospects of gaining external financial assistance, for example from regional European Development Fund sources and elsewhere. External agencies will be better able to serve regional needs, and will know that they can target their activities more precisely, if cohesive regional policies exist. Finally, a regional approach will provide a framework within which CTA can promote the establishment of national focal points and regional branch offices, which will help people in the regions to obtain greater benefits from the limited resources that can be made available through CTA.

The Fourth Lomé Convention requires CTA to provide technical and scientific support to ACP countries to assist them in formulating their information policies and programme. CTA is therefore playing a catalytic role in promoting the formulation of agricultural information policies based on cooperation between institutions with similar responsibilities at national, regional an international levels. It is intended that the ACP States themselves should take control of the radical changes needed to produce coordinated information programmes; CTA's role will be to support activities which foster the development by ACP States, at national and regional levels, of their own capacities for the production, purchase and exchange of agricultural information.

To this end, regional programmes are centred on training in agricultural communication, the production of agricultural scientific journals, the strengthening of agricultural extension systems, the production and exchange of agricultural radio and television programmes, activities on functional literacy and the establishment of integrated agricultural information sub-regional systems.

CTA believes that these activities will lead to better integrated regional areas as far as the organisation and access to agricultural information is concerned. The strengthening of national institutions and the setting up of databases will create the conditions conducive to regional integrated systems whose efficiency will be reinforced by new information technologies. Co-operation with regional and international institutions, systems and networks in relevant areas will be forged to encourage the exchange of information, methodologies and the sharing of experiences.

CTA also believes that by putting these issues on the political agenda, the situation could be improved. It is therefore aiming at the highest political level. It plans to get support from the ACP-EU Joint Assembly, whose meeting is scheduled next week in Dakar and to organise conferences of ministers by the end of this year.

Conclusion

During its first phase of development, CTA has implemented an number of important activities on agricultural information dissemination. This has helped the centre to identify the constraints and resources of the ACP countries to accessing information and also to identify the limitations of its action in relation to the huge demand for information. CTA has come to the conclusion that sustainability can only be guaranteed through a progressive adoption of CTA's mandate by the ACP countries themselves. The formulation of agricultural information policies at national and regional level will help to achieve this strategic goal.

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THEINDOU NIANG is the Head of the Information and Documentation Unit at CTA.

CONTACT ADDRESS:

Thiendou Niang
Technical Centre for Agricultural and
    Rural Cooperation (CTA)
Agro Business Park 2
NL 6708 PW Wageningen
THE NETHERLANDS
Phone: +31-317-467140
Fax: +31-317-460067

International Partnerships for Improving Access to Agricultural Information in the Developing World: The Role of CAB International

C.P. Ogbourne, T. Ison

ABSTRACT: A critical message throughout Agenda 21 of the United Nations Conference on Environment and Development is that solving complex problems associated with the global distribution of information demands a collaborative approach. Agenda 21 laid strong emphasis on the urgent need to accelerate information transfer to the third world. This paper reviews some of the partnerships in which CAB International is participating in support of the dissemination of scientific and technical information in the agricultural sector of the developing world. It indicates the main thrusts for strengthening collaborative activities in the information domain, so as to build on the global response to Agenda 21 recommendations.

RESUMÉ: Le message crucial de l'Agenda 21 de la conférence des Nations Unies sur l'Environnement et le développement, est que pour résoudre les problèmes complexes associés à la distribution globale de l'information, il faut travailler en coopération. L'Agenda 21 met l'accent sur le besoin urgent d'accélérer le transfert de l'information vers le Tiers monde. Cet article passe en revue certaines activités de coopération, où CAB International participe à la diffusion de l'information scientifique et technique vers les secteurs agricoles des pays en développement. Il indique les grandes initiatives pour renforcer les activités de coopération dans le domaine de l'information, basées sur les réactions aux recommandations de l'Agenda 21.

RESUMEN: Un mensaje crítico que se aprecia a lo largo de la Agenda 21 de la Conferencia de las Naciones Unidas sobre Medio Ambiente y Desarrollo es que la resolución de los problemas complejos relacionados con la distribución mundial de información exige un enfoque colaborativo. La Agenda 21 hizo mucho énfasis en la urgencia de acelerar la transferencia de información a los países en desarrollo. Este documento analiza algunos de los esfuerzos colaborativos en que participa el CAB International para apoyar la difusión de información científica y técnica en el sector agrícola del mundo en desarrollo. Se indican las principales actividades para el fortalecimiento de las actividades colaborativas en el campo de la información, a fin de promover la respuesta mundial a las recomendaciones de la Agenda 21.

EVERYONE AT THIS CONGRESS must have heard or read a great deal about the UN Conference on Environment and Development (UNCED), the so-called Earth Summit, held in Brazil in June 1992. For those of us here I think the event was especially significant because of the attention it focused, on the world stage, to information as the fuel for sustainable development. As many of you will know, this was the theme of Chapter 40 of *Agenda 21,* the global action plan that UNCED endorsed.

The main points in Chapter 40, about:

- the importance of information to sound decision-making;
- the widening information gap between the developed and developing worlds;
- the weak capacity of developing countries to collect, transform and disseminate information;
- their need for trained information specialists, and for information technology; and
- the shortage of financial resources in the Third World for purchasing information products and services from abroad.

These points are well understood by IAALD members, and are now being recognised by a much wider community. The points recur throughout the sectoral chapters of *Agenda 21,* including the one on sustainable agriculture and rural development.

A critical message throughout *Agenda 21* is that solving the complex problems associated with the global distribution of information demands a collaborative approach. This theme was taken up at an international consultation in April last year hosted by the International Development Research Centre (IDRC) on "Environment, Information and Development" (McConnell & Melesse, 1994) with participation from several UN bodies, other international agencies including CAB International (CABI), and various non governmental organizations (NGOs). All agreed that to respond fully to

Agenda 21, those organisations with a mandate in this area should consult widely among themselves, share ideas and experiences, and develop complementary approaches and collaborative partnerships. Only then will the process of disseminating information equitably to all those in need gain the momentum it deserves.

The purpose of this paper is to convey this message in the agricultural context by: reviewing some of the partnerships in which CABI is participating in support of the dissemination of scientific and technical information in the agricultural sector of the developing world, and indicating the main thrusts of our strategy for strengthening collaborative activities in the information domain, so as to build on the global response to *Agenda 21* recommendations.

The Main Actors and Their Roles

On the agricultural information stage, there are many players, with a wide diversity of roles. They include United Nations (UN) agencies like Food and Agriculture Organization of the United Nations (FAO), other inter-governmental organisations like CABI, international institutes of the Consultative Group on International Agricultural Research (CGIAR), technical agencies like the Technical Centre for Agricultural and Rural Cooperation (CTA), regional organisations, library centres of highly developed countries (such as the US National Agricultural Library (NAL) and the Centre de Cooperation Internationale en Recherche Agronomique pour le Développment (CIRAD), bilateral and multi-lateral development agencies, various NGO's, and many more, including of course the agricultural institutions of the developing world. Each player has something to contribute such as specialised information resources; skills in information technology; knowledge of, or experience in evaluating developing country information needs; experience in the design and operation of agricultural information systems; training skills in information management; expertise in project management; or financial resources. When linked together in a framework of co-operation, these skills and resources enable a variety of roles to be played in support of agricultural research and development in the developing world.

These roles include:

- assisting in policy making and planning for agricultural information systems;
- helping to identify the users of information and define their needs;
- supporting capacity building through training of information specialists, and the users of information;
- co-ordinating and servicing library or research networks;
- supplying, or financing the purchase of, information resources;
- advising on, and helping with the adoption of, appropriate information technologies;
- providing technical and other assistance in the collation of information at the national or regional level; and
- supporting the creation of specialised information products and services appropriate to developing country needs.

CAB INTERNATIONAL Mission Statement

CAB INTERNATIONAL is dedicated to improving human welfare worldwide through the dissemination, application and generation of scientific knowledge in support of sustainable development, with emphasis on agriculture, forestry, human health and the managment of natural resources, and with particular attention to the needs of developing countries.

CABI, as one of the players on the agricultural information scene, has the mandate, capacity and experience to fulfil many of these roles, and we are striving hard to do so as part of our mission for the developing world.

Let me remind you that CABI is an inter-governmental organisation and that 33 of its 36 member countries (owners) are from Africa, Asia, the Pacific and the Caribbean. Clearly, our first obligation is to help fulfil their needs, then those of any other countries where our services are required.

Over the last five or so years, CABI's ability to support economic and social development through the provision of services in the information/publishing domain has increased considerably, and this is expected to continue as we:

- extend beyond the traditional boundaries of agriculture and forestry, into the management of natural resources including biodiversity, and the protection of human health;
- establish a firmer base of operations in developing regions, centred on a growing network of regional offices;
- strengthen collaborative programmes with a wide range of like-minded organisations worldwide; and
- attract more and more support for our programmes from the donor community.

Agricultural Information Policies and Plans

Planning for sustainable development, in whatever sector, should be based on timely, reliable and usable information. This is what *Agenda 21* tells us and what we all know. Unfortunately however, in many developing countries there is too little recognition among decision makers of the value of information, and inadequate resources are applied to its provision, for this to happen reliably.

In the agricultural sector, many of the national or regional research systems of the developing world lack a clear strategic framework for the development and maintenance of an effective information system. As a result, their agricultural information systems tend to be too poorly focused and resourced to meet user needs effectively. This was one of a number of important points emphasised during an international consultation held two years ago on the information management needs of national agricultural research systems (NARS) which was co-sponsored by ISNAR (the International Service for National Agricultural Research), by CABI and CTA.

Various issues concerning information management by NARS were addressed at this meeting including the need to develop and implement information policies and plans in line with national agricultural strategies and priorities; the importance of taking a broad view of information to include relevant data of various kinds; the fundamental role of needs assessments and how they should be conducted; training requirements for information professionals and users; the need to improve access to information generated at national or regional level; the appropriate role of information technology; and others. ISNAR published a short report of the meeting (*ISNAR, 1993)* which deserves to be widely read, especially by the decision makers of NARS and by the donor community. The report contains key messages about the priority they should give to information management in agricultural research and development, to the formulation of appropriate information policies and strategies, and to investment in appropriate information systems. Regrettably, library and information professionals in many developing countries have neither the status nor access to decision makers to put these messages across effectively themselves. We in the international agricultural information community should therefore give as much help

as we can to raise understanding of the key role of information in the implementation of national agricultural plans.

It is encouraging that ISNAR, which has a mandate within the CGIAR system to help improve the performance of the NARS, now lays firm emphasis on the importance of efficient information systems and communications to productive agricultural research. The ISNAR Small Countries Programme for example had a large information component (*IAALD 1993*) which was put into strong focus during a workshop held in April 1992. At that meeting information specialists from international agencies and small-country NARS agreed to a number of recommendations which were presented the following week to a meeting of senior policy makers and research managers. This was a rare opportunity for information professionals, as a group, to persuade senior decision makers from developing countries to give information systems the high priority they deserve. The message is highly pertinent for small countries which mostly lack the resources to run large agricultural research programmes of their own and have, therefore, to depend on the import of knowledge from abroad if they are to make good use of science and technology to improve agricultural production.

Various other organisations share ISNAR's commitment to strengthening the role of information in the development of national policies and plans for agriculture. CTA, for example, which is doing a lot of good work, especially in Africa. NAL, the Inter-American Development Bank (IADB) and the Latin American Association of Agricultural Librarians and Information Specialists (AIBDA) co-operated in a workshop last year on a regional approach to agricultural information networking in Latin America and the Caribbean. Various other initiatives could be mentioned, but the effort needs to be strengthened and sustained if the required impact

is to be achieved.

CABI is glad to have contributed to many of these initiatives and we plan to do more in future, by participating as much as possible in workshops, undertaking consultancies, and by giving advice whenever it is requested, especially by our member countries.

Needs Assessments

The international consultation hosted by ISNAR concluded that in many developing countries one of the most serious constraints to the development of efficient agricultural information systems is poor understanding of user needs. Scientists, managers, and policy makers often have difficulty specifying exactly what information they require; and information specialists may not have the skills or experience to do this for them. Fortunately, several external organisations are addressing this problem by helping raise the capacity of developing countries to undertake this first, crucial step in information system design.

CABI has run a needs-assessment programme since 1990, in partnership with a number of its developing member countries. At the invitation of the governments concerned, 15 countries in Africa, Asia and the Caribbean have been visited by CABI staff who worked in partnership with local personnel to study the information needs by various categories of user in the agriculture and forestry sectors. The needs for specialised scientific services within the areas of expertise of CABI's four scientific institutes were also examined. The mission reports were issued by CABI, with the agreement of the host governments concerned, and donor agencies were then asked to provide funding for follow-up work programmes. [Table 1]

CTA also began carrying out needs assessments in 1991, priority being given to African countries. These have now grown into regional programmes involving widespread consultation with representatives of

Table 1 – CABI's Country Assessment Missions

Uganda	March 1990	**Vietnam**	March 1992
Philippines	July 1990	**India**	March 1992
Guyana	October 1991	**Malawi**	March 1992
Zambia	October 1991	**Nepal**	December 1992
Jamaica	October 1991	**Sri Lanka**	January 1993
Belize	October 1991	**Myanmar**	January 1993
Indonesia	February 1992	**Bangladesh**	February 1993
Thailand	February 1992		

national agencies, and experts from sub-regional, regional and international organisations.

The CABI and CTA needs assessment studies led to a similar conclusion: that most developing countries lack the resources, equipment and trained staff that they need to establish and sustain reliable agricultural information services. CTA's findings are being used to guide its future programmes, whereas the CABI surveys were orientated more towards specific projects for strengthening the countries' access to, and capacity to manage, scientific information. Some of these projects, involving training in information management and the supply of printed publications, CD-ROM databases and computer hardware, have now been implemented, with funding from various donor sources. Others await funding or are still being finalised.

CABI has no further needs assessments planned in the short term, since priority attention is still being given to implementing recommendations from the 15 surveys already conducted. Since 1991, CABI staff have gained much valuable experience in this kind of work, which will be made available to other developing countries (particularly CABI member countries) in the future, preferably in cooperation with other external agencies, like CTA, also working in this area.

Training in Information Management

Another need identified in *Agenda 21* is for international co-operation in training to improve the ca-

pacity of developing countries to collect, assess and transform information, as well as to assist decision makers in its use. Not surprisingly, information training needs emerged strongly from CABI's and CTA's needs assessment programmes.

Various organisations have been running training courses for agricultural librarians and other information specialists for quite some time. For example, CTA has organised a number of courses overseas, usually on specific library management skills such as the use of micro-computers and the marketing of information services, often run jointly with regional organisations or institutes of the CGIAR. It also runs courses on science writing and editing. Since 1979, CABI has run annually in the UK a 2- to 3-week "Information on Agriculture" course for librarians and documentalists which to date has been attended by almost 300 people from many countries. Participation has been funded by CTA, the British Council and the Commonwealth Fund for Technical Co-operation (CFTC), and others.

Despite the success of this course, we have recently adopted a new training strategy under which our training efforts will be more concentrated overseas. CABI's Regional Office for Asia in Kuala Lumpur has already organised a regional course, in 1992 in co-operation with the University Pertanian Malaysia, and is planning others, including one this year on management of information to enhance the role of women in sustainable development. CABI's other Regional Offices—for Africa (in Nairobi) and the Caribbean (Trinidad)—will also pro-

mote training initiatives in their regions, again in co-operation with other agencies. We shall seek partners in the organisation and teaching of such courses and, where possible, local experts will be called upon as trainers. The UK-based "Information on Agriculture" course will no longer be held but a programme of modular work placements or training attachments at CABI (and other bodies like the British Library) for periods varying from a week to several months will be offered for anyone wishing to acquire specific information-handling skills.

These training initiatives, and ones led by other organisations, are clearly filling an important need but much more has to be done, over a long period, to meet *Agenda 21* objectives in this area. The need to raise the awareness of end users of the value and use of information also deserves closer attention. This should obviously be a stronger component of the professional education of researchers, but specialised courses, like the one given in 1992 in the Caribbean supported by the Commonwealth Science Council, serve a very useful purpose and should be repeated more often.

Improving Access to Global Information and to Information Technology

As is well known, a persistent obstacle to the agricultural development of Third World countries is the limited access they have to global sources of scientific and technical information. Except for the few well supported libraries, most have little or no foreign exchange for purchasing journals, books and databases from abroad, and have to depend on donations or exchange arrangements, which are rarely enough to satisfy user needs. Many developing countries also lack the information technology that would enable them to access and manage information resources efficiently. These problems are well recognised in *Agenda*

21 which calls for the stronger mechanisms of information processing and exchange, and for innovative schemes for subsidising access to information from commercial sources.

International Agricultural Information Systems – Agricultural researchers are fortunate in being served by three major bibliographic databases: AGRICOLA, AGRIS and CAB Abstracts. The last two cover extensively the literature relevant to developing countries. Unlike the databases of NAL and FAO, CAB Abstracts does not benefit from any subsidy from government sources. Its price therefore reflects the real costs of preparing the data to high quality standards. Although this price has been kept below that of comparable databases in other disciplines, nonetheless we recognise that for most developing countries the purchase of CAB Abstracts and its various products is simply beyond their reach. This is despite the fact that institutions or individuals in the 36 member countries of CABI are entitled to a price discount, as one of the benefits of membership.

To help overcome this problem CABI has developed a strategy of working in partnership with other international organisations and the development assistance community to make its information resources and information management expertise more widely available to those countries in need but which have little or no capacity to pay.

Sponsorship – One way of doing this is to make specific information products available under favourable terms to other institutions with a mandate to distribute information to the countries most in need. Since the early 1980's, this has been the principal basis of CABI's co-operation with institutes of the CGIAR, several of which have sponsored the distribution of printed outputs of CAB Abstracts to thousands of their collaborating institutions in the developing world. Other partners we have include the Dutch Government

Table 2 – Donors Funding Supply of CABI Products Under Sponsorship or Technical Assistance Projects

Donor	Number of Sites	Countries	Subject Area
ADB	34	1 (China)	Agriculture
ADB/UNDP	12	11 (Asia/Pacific)	Forestry
AIDAB	7	7 (Asia/Pacific)	Forestry
CTA	31	28 (ACP)	Agriculture
DGIS	7	1 (Kenya)	Agriculture
FAO	15	15 (Africa)	Crop Protection
ODA	11	11 (Africa/Asia/LA)	Forestry
World Bank	5	1 (Ghana)	Agriculture

(DGIS) which supports information dissemination under its Special Programme for Biotechnology and Development Co-operation.

Nowadays, however sponsors and donors are more willing to finance the supply of electronic information retrieval systems and resources to developing countries than pay for subscriptions to printed journals. The high storage capacity, durability and independence of telecommunications that characterise CD-ROM technology make it ideal for use in the developing world, and CD-ROM retrieval systems are now being installed in many countries, under projects financed by various donors.

CTA has taken a strong lead in this with its CD-ROM sponsorship programme (Dusink, 1994). After becoming convinced of the virtues of this technology by a study conducted with CABI, IDRC and others in 1986, CTA launched a pilot project to provide 12 agricultural information centres in ACP countries with CD-ROM equipment, databases and user training. This was successful and by the end of 1993 CTA had sponsored the installation of CD-ROM workstations and databases (those of CABI, AGRIS, NAL and other producers) at 31 sites in 28 countries under a programme executed by the Royal Tropical Institute (KIT). Now a variety of development assistance agencies recognise the contribution that CD-ROM technology can make to bridging the information gap between the developing and devel-

oped worlds and have begun including CD-ROM systems and a range of databases in their development projects.

To date, CABI's products have been supplied under sponsorship or technical assistance projects funded by CTA and six other donors (Table 2). These include the Asian Development Bank (ADB), Australian International Development Assistance Bureau (AIDAB), FAO, UK Overseas Development Administration (ODA) and the World Bank. To date, 122 institutions have benefited, in many countries of Africa, South America, the Caribbean, Asia and the Pacific. Usually the donor funds have covered the full cost of supplying the hardware (PC, CD-ROM drive and printer), user training, the databases and updates for the lifetime of the project (usually three years), and a quota of pre-paid document delivery coupons which can be used to acquire copies of selected articles through CABI's Document Delivery Service.

In some cases, CABI has taken the lead in securing the funds for these projects, basing its proposals on demands recorded during country needs assessments or received directly from potential beneficiary organisations. In other cases, CABI has supplied products and services directly in response to requests received from donor agencies, or the initiative has been taken by the potential beneficiaries themselves.

A notable example of a country deciding to upgrade its agricultural information system by introduc-

ing CD-ROM technology is China, whose government insists on evidence of a literature search going back at least 10 years before any research project can be approved. To provide the necessary information retrieval facilities, the Chinese Academy of Agricultural Sciences (CAAS) began in 1992 strengthening the Scientech Documentation and Information Centre (SDIC) in Beijing and establishing CD-ROM workstations in 34 major agricultural research and training institutions throughout the country. Funds were provided by the Chinese Government supported with a technical assistance grant from the Asian Development Bank. Each site was supplied with the necessary hardware, and with the CAB Abstracts database (CABCD from Volume 1), supplemented at eight centres with the AGRIS database. SDIC also requested subscriptions to a full set of CABI abstract journals.

These activities were managed under a 3-year project executed jointly by CABI and SDIC (Zhang, 1994). Included was a three-week training course in information management, which was held in Beijing in October 1992 with several CABI staff contributing as trainers. During the following year, SDIC selected 10 Chinese information specialists for three months' training overseas, at CABI, ZADI in Germany or FAO in Rome.

This is a substantial programme which has undoubtedly had a significant impact on the availability of global information to the agricultural sector of an enormous country. It will be formally evaluated in 1995.

CABI's CD-ROM sponsorship programme has been running for four years now and we have recently begun to evaluate its impact, first priority being given to Africa. A questionnaire has been distributed (in English and French) to all sponsored sites throughout the continent and an African library consultant has visited selected centres in Kenya, Zimbabwe and Ghana to interview information managers and users. The evaluation report is expected to be completed in March and will help guide the further development of CABI's CD-ROM sponsorship programme.

This study comes in the wake of a thorough evaluation exercise of CTA's sponsorship programme which was completed by a team of consultants in 1994 (Broadbent *et al*, 1994). The report and recommendations are now being taken into account by CTA in planning the future direction of its programme. Database selection, feedback from users, co-ordination with other donors, user training and local networking are among the issues being considered. To maximise the impact on information availability to the Third World, CABI will be seeking closer coordination with CTA and the various other bodies supporting CD-ROM sponsorship programmes.

Research Networks – Although information support to the agricultural sector of developing countries is often given in the context of CD-ROM or more broadly based library projects, information dissemination also forms an important element of co-operative research. This is well recognised by the institutes of the CGIAR but at the present time, they are constrained in their ability to run external information programmes by cutbacks in donor funding. Despite this, CABI is still co-operating with two CGIAR institutes by supplying abstracts journals under sponsorship, and other institutes continue to subscribe to CAB Abstracts data in electronic form enabling them to offer SDI and on-line search services to research partners directly. A good example is the information service on semi-arid tropical crops offered by ICRISAT which is based on CABI, AGRIS and supplementary data sources. In addition, CABI and various institutes are co-operating increasingly in the free or cheap distribution of books to developing countries. Under special agreements new books authored by institute staff or associates and published by CABI are made available for free or cheap distribution to selected NARS addresses.

Despite funding constraints, awareness of the role the CGIAR should play in strengthening the research capacity of the NARS by supporting information programmes has grown considerably over the last few years. One NARS leader (from India) has publicly proclaimed recently that this is the kind of help from CG centres that the NARS most need. The information policies and strategies of the CG system are currently under review. As a contribution to this, CABI and FAO-AGRIS were invited to address a meeting last March of the CGIAR Technical Advisory Committee and centre directors. I hope that opportunities for co-operation in CG information programmes by CABI, AGRIS and others, will in due course emerge.

China-ADB Sponsored Information Project

- Provision of PC and CD-ROM equipment
- Provision of CABCD plus updates for 3 years to 34 key research establishments in China
- Provision of AGRIS on CD-ROM to 8 sites
- Provision of a complete set of CABI's printed abstract journals to SDIC
- A comprehensive 3-week training course in Information Management and Technology held in Beijing
- Three months overseas training for 10 key personnel
- Monitoring and evaluation throughout the project period

One fairly immediate opportunity could be in an integrated livestock information service which is being planned by the new International Livestock Research Institute (ILRI), recently created by the merger of the International Livestock Research Centre for Africa and the International Laboratory for Research in Animal Diseases. ILRI's intention is that this service will be founded on a partnership involving other CGIAR centres, CABI, FAO-AGRIS, CIRAD, regional organisations and other key sources of livestock information. ILRI will play a central coordinating role, managing linkages between the various players involved, including the NARS of developing countries which will be the main beneficiaries (Sinha, 1994).

The other new CGIAR institution, the Centre for International Forestry Research (CIFOR) in Indonesia, is already developing a substantial information programme. For example, with a grant from ODA a CD-ROM sponsorship programme is being implemented, involving the installation of CD-ROM technology and the TREECD database in up to 20 forestry research centres world-wide, backed up by user training. Supplementing this, a document delivery service is being made available by CABI and the Oxford Forestry Institute which has one of the world's largest collections of forestry literature. CABI and CIFOR are now planning the training programme which will be held at CIFOR in April.

In Asia and the Pacific, CIFOR's information programme in support of forestry research complements the Forestry Research Support Programme for the Asia-Pacific (FORSPA) which is supported financially by Asian Development Bank (ADB), United Nations Development Programme (UNDP) and FAO, and managed from FAO's Regional Office in Bangkok. Under a Technical Assistance Agreement with the ADB, CABI has been managing an information network for FORSPA from our Regional Office

for Asia in Malaysia, since 1991.

The whole FORSPA programme was evaluated in 1994 and judged to have been successful in strengthening the forestry research capacity of countries in the region. A new phase of operations is therefore about to begin, with other donors (AIDAB, ODA) now joining ADB and FAO in contributing to the expenditure budget. About 15% of the funds are earmarked for information and publishing activities which will be supplemented in the second phase with more TREECD sites, updates for all 22 sites, greater emphasis on information training, and on the collation of national information resources. CABI will again manage this part of the project, in partnership with FAO, the donors and the national forestry centres of the region.

The information component of FORSPA has been supplemented by another project financed by AIDAB which started in 1993. This has enabled CABI to provide another 11 forestry institutes in China and South East Asia with access to CD-ROM technology and global forestry research data through the TREECD. User training was again given at our Asian Regional Office. An evaluation of this project is in progress.

Over the last few years, CABI's collaboration under FORSPA, with CIFOR, ODA and AIDAB, has had a significant impact on information availability to forestry research centres, particularly in Asia. By the end of 1995, TREECD workstations will

have been installed in over 60 forestry research centres, all of which will have received broadly based training in information management. Although most of the beneficiaries so far have been in Asia, we expect other countries to gain from similar donor-funded programmes in the future. Some of the CIFOR-selected sites will be in Africa (also Latin America) but a further momentum may come from a FORSPA-type initiative which is being planned by FAO and others, and which will include a substantial information component.

Current Awareness, Question & Answer and Document Delivery Services – Another model of international co-operation benefits developing country researchers directly by providing them with tailor-made SDI, Question & Answer, and Document Delivery Services. Again CTA took a significant lead in 1988 by launching a pilot SDI project for researchers. This has grown into a substantial programme now served jointly by CABI (taking responsibility for Southern Africa, Caribbean and Pacific countries) and Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) (East, West and Central Africa). CTA also provides users in ACP countries with a Question & Answer Service which aims to provide an appropriate and timely response to a wide range of enquiries on agricultural topics. CTA itself, or contrac-

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FORSPA – Information Component
Managed by CABI's Regional Office for Asia
Funded by the Asian Development Bank

- Provision of CD-ROM equipment to 12 sites
- Supply of TREECD with quarterly updates
- Distribution of Subscriptions to Forestry Abstracts (25 centres)
- Training of information specialists from the 12 TREECD sites
- Provision of document delivery based on pre-paid vouchers
- Production and distribution of a quarterly newsletter
- Publication of monographs and reviews on regional topics

tors such as CABI, CIRAD and KIT, search databases and other sources for the information needed, and copies or originals of relevant documents are often provided to the enquirer.

In a similar way, the INFOTERRA system, which is a decentralised network of information centres managed from United Nations Environmental Programme (UNEP) in Nairobi, responds to enquiries on environmental topics from a wide variety of sources. Data are supplied either from UNEP itself, from other UN bodies, or other international organisations. The latter include CABI which is designated a special sectoral source of information on agriculture and the environment. *Agenda 21* calls specifically for the strengthening of the INFOTERRA system and for stronger networking and co-ordination with other actors in the environmental information field. Given the close interaction between the environment and agriculture, this should become another significant way for developing countries to access global information.

UNEP also seems likely to become the UN agency responsible for managing a clearing house of information on biodiversity, as required under the Biodiversity Convention (another outcome of UNCED). Considering the importance of plant genetic resources to plant breeding programmes, and the need to conserve natural enemies of pests for use in environmentally friendly and sustainable methods of crop protection, the services offered by this clearing house should prove valuable to the agricultural sector of developing countries. CABI was privileged to participate in a workshop held by UNEP in August 1994 to advise on the operation of such a clearing house and we have offered to contribute actively to its implementation, in partnership with the various other parties that are sure to become involved. In June 1996 in London, associated with CABI's Review Conference of Member Governments, we plan to cooperate with other key players in

holding a workshop on biodiversity information which should help focus international attention on this important topic.

Information Products Designed to Meet Developing Country Needs – With support from external agencies, especially from the donor community, CD-ROM databases have contributed significantly towards filling the information vacuum in the developing world. However, this kind of information resource cannot directly assist the decision-making process without the intervention of trained intermediaries able not only to select but also to digest and evaluate the information in relation to national goals and priorities. Unfortunately, this capability is either weak or lacking in most parts of the developing world, as acknowledged in *Agenda 21.*

Addressing this particular issue, a significant initiative began recently to harness the power of information technology to develop an Electronic Compendium for Crop Protection (Scott & Schotman, 1993). Consisting of text, maps, illustrations, taxonomic keys, diagnostic systems and other features in a user-friendly format, for use on a PC, this will provide information in a form applicable to a wide variety of practical problems in crop protection, with emphasis on integrated pest management. The compendium concept emerged from an international workshop on crop protection information organised by CABI, CTA and FAO in 1989. A subsequent meeting of crop protection experts from around the world, gave it strong support, and a demonstration version of a Compendium was therefore produced on diskette with grant aid from the Australian Centre for International Agricultural Research (ACIAR). This demonstration diskette was used in a survey which confirmed the keen interest of a wide range of potential users including extension officers, the agrochemical industry, quarantine officers, research scientists, lecturers, policy makers and regional plant protection organ-

isations.

Work has now started on a Compendium for South-East Asia (as the forerunner to global coverage) which will contain information on a thousand or more species important to the region (including arthropod pests, fungal, bacterial and viral diseases, weeds and invertebrate pests) and about two hundred crop species. Illustrated datasheets are being prepared on contract by selected specialists drawn from research institutions in various countries and will be supplemented, where appropriate, with information held by established sources. For example, the PROSEA Foundation which has compiled a series of books on *Plant Resources for South-East Asia,* soon to be published on CD-ROM with support from PUDOC (Netherlands), will be an important source of datasheets on crops.

Constructing this product will be a huge task requiring substantial development capital (around $1.5 million), almost half of which has already been secured through a consortium of donors. These include bilateral and multilateral aid agencies, agrochemical companies, and national agricultural organisations.

When the finished product is available, in about two years our plan is to make it available at a low price for developing countries, and sponsorship options will be offered

to third parties. CABI has undertaken to keep the product up to date without further external support. This will be facilitated by a feature of the Compendium which will allow users to send in their notes which we will sift for inclusion in updates. The user community will therefore be involved in the maintenance of this product, reflecting their actual experience of crop protection.

The compendium concept can of course be applied to disciplines other than crop protection. A demonstration version of a compendium of tropical tree species was produced last year in co-operation with OFI funded by ODA. We are now using this to gain feedback from potential users before seeking partners in the production of compendia on specific forestry topics.

Conclusions

For developing countries, every partnership project should be firmly based on at least three vital ingredients: a need, preferably a want, for the services to be supplied; a source of expertise, information resources and other relevant inputs; and a source of financial support. Of the three, the first is often the most important, otherwise time and money can be wasted doing work that is not required. Over the last five or so years, CABI has given high priority to establishing needs, to helping to develop and working within the national policies and plans of the recipient countries, to designing and managing information projects to meet the needs efficiently, contributing to developing country programmes of other organisations, and developing information products targeted especially at developing country needs.

For projects developed by CABI itself we rely increasingly on other organisations for the inputs that we ourselves cannot provide. One of the most important is financial support. CABI does not have the resources needed to fund our develop-

ing country programmes, so a donor partner is invariably required. Fortunately many donors now recognise the value of investing in information systems for developing countries and are giving us the support we require; that received from the UK, Australia and Canada (CABI member countries) has been particularly significant. Since CABI aims to give priority to its member countries, improved access to development assistance can justifiably be regarded as one of the benefits of membership.

All the activities described in this paper, and the many others not mentioned, conform to the goals laid out in *Agenda 21* and help CABI meet its mission. Each activity has depended one way or another on partnerships between organisations pursuing common goals. Further steps to improve access to agricultural information in the developing world will depend heavily on how existing relationships flourish, and on the new alliances that become established. As concluded by the IDRC meeting on Environment, Information and Development, all organisations with something to contribute should make their capabilities, resources and experience widely known and be alert to opportunities for integrating their activities with those of others, in pursuit of *Agenda 21* goals. I hope that as far as CABI is concerned that objective has been achieved today.

As I have tried to show, CABI is already working with a wide range of partners to help developing countries access and manage agricultural information resources. We have a lot to offer but need to strengthen our existing partnerships and develop others in the fulfilment of *Agenda 21* action plans and the pursuit of our development goals. The ultimate beneficiaries will be the developing countries that we all aim to serve.

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C.P. OGBOURNE is the Deputy Director-General, Information Services at CAB International and TIM ISON is the Projects Officer at CAB International.

CONTACT ADDRESS:

Tim Ison
Development Projects Unit
CAB International
Wallingford, Exon OX10 8DE
UNITED KINGDOM
Telephone: +44-1491-832111
Fax: +44-1491-833508
E-Mail: t.ison@cabi.org

Les Nouvelles Technologies de l'Information dans les Centres et Systemes de Documentation Agricole en Afrique Francophone: Evaluation et Perspectives

P. Dandjinou

ABSTRACT: One of the primary preoccupations in the Francophone Africian countries today is the repercussion of the new information technologies on the profiles of the information professionals, and their capabilities in meeting the users' needs. This was done through surveys carried out on the use of computers in agricultural information centres as well as the analysis of ongoing projects and achievements, to assess the overall situation and outline prospects in the processing and provision of agricultural information in francophone Africa.

RESUMÉ: Aujourd'hui, l'Afrique francophone est principalement préoccupée par la répercussion des nouvelles technologies sur la pratique des professionnels de l'information, et leur capacité à satisfaire les besoins des utilisateurs. Des enquêtes ont été faites sur l'utilisation des ordinateurs dans les centres de documentation agricole, ainsi que sur des évaluations de projets, pour analyser la situation générale et esquisser les perspectives de diffusion de l'information agricole en Afrique francophone.

RESUMEN: Una de las principales preocupaciones de los países africanos francoparlantes hoy en día es la repercusión que puedan tener las nuevas tecnologías de información en los perfiles de los profesionales de la información y en su capacidad para satisfacer las necesidades de los usuarios. Para evaluar la situación general y trazar perspectivas sobre el procesamiento y suministro de información agrícola en Africa francoparlante, se realizó una encuesta sobre el uso de los computadores en los centros de información agrícola y se analizaron los proyectos en curso y sus logros.

L'AFRIQUE FRANCOPHONE est composée d'une vingtaine de pays situés dans la partie subsaharienne du continent et partageant une communauté linguistique. Cette communauté linguistique, liée à l'utilisation du français comme langue officielle à côté d'une multitude d'autres langues nationales remonte à l'héritage colonial que laissèrent les anciennes puissances colonisatrices que furent la France et la Belgique. Malgré cette caractéristique propre, l'Afrique francophone partage beaucoup d'autres traits communs avec les autres Etats du Continent dont les 500 millions d'habitants connaissent l'un des taux de croissance démographiques les plus élévés du monde (3,1 %). De plus, avec un produit national brut de 470 US$ (1990), l'Afrique, et principalement, l'Afrique subsaharienne constitue l'une des régions les plus pauvres du monde puisque plus de la moitié des pays en développement s'y trouvent.

Une autre caractéristique de l'Afrique est la part prépondérante que le secteur agricole prend dans l'activité économique. En effet, elle occupe 70 à 75% de la population active, fournit 60 % des revenus d'exportation et demeure un élément fondamental de la production vivrière. Mais cette agriculture est loin d'être compétitive puisque, de 4% des exportations mondiales dans les années 50, elle est tombée aujourd'hui à 2 %. Les raisons en sont multiples : incertitudes liées au climat ; pluviométrie capricieuse ; démographie galopante ; pauvreté des sols ; effets pervers des pesticides ; utilisation de techniques culturales non appropriées etc.

Un autre facteur déterminant dans la modeste performance de l'agriculture africaine est la carence et la non circulation de l'information pertinente et efficiente, permettant de minimiser les effets des phénomènes adverses. Le séminaire Winrock sur les stratégies pour le futur de l'Afrique organisé à Baltimore (USA) en 1991, aboutissait à juste titre à la conclusion selon laquelle : "si l'Afrique doit envisager une société plus développée d'ici à 25 ans, les gouvernements se doivent d'être persuadés de celà [et de la nécessité] de la diffusion de l'information

sur les capacités d'approvisionnement locales et les marchés extérieurs".

L'information agricole est recherchée par un public varié allant des producteurs agricoles aux chercheurs et décideurs politiques, en passant par les agents de vulgarisation ainsi que les spécialistes de la planification agricole et rurale. Cette information est produite dans les différents pays et à l'extérieur, et devrait subir une demande accrue dans les années à venir. En effet, selon les précisions de la FAO, les pays en développement devraient pouvoir augmenter leur productivité agricole d'une moyenne de 3,8 % à 4,1 % d'ici à l'an 2000 grâce à l'utilisation des connaissances scientifiques et techniques disponibles.

En Afrique francophone, l'information agricole et notamment la documentation écrite est produite et traitée dans des centres nationaux de recherche agronomique (CNRA), dans des bibliothèques universitaires et nationales, dans des bibliothèques et centres de documentation spécialisés dépendant des ministères en charge de l'Agriculture, du développement rural, de la foresterie, des ressources animales et même de la recherche scientifique. Ces différentes structures sont pour la plupart des resurgeances d'anciennes institutions coloniales de recherche ou de documentation agronomique.

Avec la généralisation de l'utilisation de l'outil informatique en Afrique, on assiste à une banalisation de l'ordinateur au sein des structures de traitement de l'information agricole. Ainsi, le taux d'informatisation des centres de documentation agricole est passé d'environ 17 % en 1988 à près de 57% en 1993 sous l'action conjuguée des bailleurs de fonds internationaux, des institutions de coopération multilatérale et bilatérale et plus rarement des initiatives locales.

A côté des micro-ordinateurs, on retrouve désormais d'autres équipements tels que les lecteurs de disques compacts à mémoire fixe (DC-

MEF ou CD-ROM), les scanners, et des modems pour la communication électronique. C'est dire que toute une panoplie de nouvelles technologies sont désormais en place au sein des unités de documentation agricole qui pour la plupart n'ont plus grand chose à envier à des unités de documentation similaires dans les pays développés.

Après plus d'une dizaine d'années d'utilisation de la micro-informatique pour le traitement de l'information agricole en Afrique francophone, et dans le contexte économique actuel marqué par la réduction progressive des projets initiés par l'assistance extérieure, et la raréfaction des moyens financiers, il nous a paru nécessaire d'évaluer le rôle et la portée des nouvelles technologies dans la diffusion de l'information agricole. De plus, les repercussions des nouvelles technologies sur les pratiques des professionnels de l'information agricole, souvent initiés sur le tas à ces technologies, méritaient d'être analysées.

Enfin, la consultation de nombreux rapports nationaux présentés par les participants aux séminaires de formation de l'EIB et du CTA et les données recueillies au cours d'activités de consultation permettent d'esquisser les perspectives d'une meilleure diffusion de l'information agricole en Afrique francophone grâce à l'utilisation efficiente des nouvelles technologies.

Les Nouvelles Technologies et Leur Utilisation en Afrique Francophone

Nous proposons une brève typologie de ces nouvelles tehnologies, les Les mécanismes de leur implantation dans les structures documentaires et l'évaluation qu'on peut en faire.

La Micro-informatique – Mis à part le réseau sahélien de documentation du CILSS à Bamako (Mali), équipé d'un mini-ordinateur HP

3000, les centres de documentation agricole dans les pays africains francophones utilisent un ou plusieurs microordinateurs. On note une disparité tant au niveau du nombre d'unités disponibles par centre qu'au niveau des marques d'ordinateurs.

Dans une étude en 1992 auprès des structures de documentation agricole de 6 pays d'Afrique subsaharienne (dont 5 francophones et un anglophone), on pouvait relever les pourcentages ci-après quant à la proportion de centres disposant au moins d'un micro-ordinateur :

Mali	7,4 %
Sénégal	45 %
Niger	42 %
Burkina	11 %
Cameroun	80 %

Dans une enquête ciblée auprès de 25 institutions informatisées de 14 pays africains francophones en Juin 1993, le parc se présentait ainsi :

Micro-ordinateurs compatible PC/PS2	27
Micro-ordinateurs Macintosh	2
Imprimantes matricielles	15
Imprimantes laser	6
Imprimantes à jet d'encre	1
Onduleurs	16
Lecteurs de CD-ROM	4

90 % des micro-ordinateurs sont des compatibles IBM PC/PS2 et 14 marques différentes ont été repertoriées. Ces marques sont rarement représentés dans les pays, avec l'exeption notable de la gamme IBM (60 % du marché, Zenith Data-Bull (20 %) et Macintosh (10 à 20 %) qui réalise actuellement des percées. Il convient de relever que la grande majorité des équipements informatiques ont été acquis grace à l'assitance étrangère.

S'agissant des logiciels de gestion documentaire, on note une prépondérance du micro CDS-ISIS de l'UNESCO dans plus des 3/4 des sites, suivi de Texto, diffusé par la société française Chemdata. De façon marginale, on rencontre quelques sites

ayant développé un logiciel maison à partir du SGBD DDase +.

Le succès de CDS/ISIS est dû à plusieurs facteurs : il est offert gracieusement par l'UNESCO et a bénéficié depuis les années 1990 de programmes de formation et de perfectionnement supportés par l'UNESCO, l'ACCT-EIB, le CTA et la GTZ. De plus, plusieurs pays disposent actuellement d'une masse critique de professionnels ayant une expérience pratique du logiciel au point d'envisager des sessions de formation au niveau national et souvent dans le cadre d'associations d'utilisateurs (au Niger par exemple) ou de réseaux nationaux de documentation agricole (Le Sénégal en est un cas). L'action de la FAO n'est pas à négliger, d'autant que ses systèmes d'information AGRIS et CARIS ont été développés autour du même logiciel et ont induit l'informatisation et la mise à niveau permanente des centres participants à ces systèmes.

TEXTO pour sa part est commercialisé au prix moyen de 20.000 FF et a connu une relative percée dès 1985 avec l'appui de la coopération française et par l'entremise des systèmes d'information tels que IBIS-CUS et plus récemment le PAR-DOC (Programme d'Appui Documentaire de l'AIPLF).

A ce jour, l'utilisation des micro-ordinateurs dans les structures de documentation agricole d'Afrique francophone a principalement permis de :

• développer des bases de données bibliographiques (95 à 98 % des cas);

• développer des bases de données factuelles (principalement des repertoires et annuaires);

• transférer des données vers les sources extérieures : exemple des Input Agris/Caris;

• rechercher l'information agricole à partir des bases de données locales

• produire des catalogues bibliographiques ainsi que des bulletins bibliographiques ou de liaison.

Le Compact Disque à Mémoire Fixe (CD-ROM) – Introduit en Afrique francophone dès les années 1990, le compact disque à mémoire fixe a connu un succès qui est largement à la mesure des nombreux avantages qu'il procure. Du fait de l'indépendance qu'il procure vis-à-vis des liaisons téléphoniques par ailleurs quasi défectueuses dans la plupart des pays, et compte tenu de l'appui important que les bailleurs de fonds lui ont donné, ce support optique était appelé à s'imposer en Afrique.

Le récent rapport statistique sur l'inventaire des sites de CD-ROM dans les pays en développement et dans les pays d'Europe de l'Est réalisé par Gilles Deschatelets et Maryse Legault de l'Université de Montréal prouve à suffisance que le CD-ROM a été adopté en Afrique et singulièrement dans les unités de documentation agricole.

Ainsi, sur 639 sites recensés, la distribution est la suivante :

Afrique	240	(37,6 %)
Asie	14	(23,0 %)
Amérique latine	203	(31,8 %)
Océanie	6	(1,0 %)
Europe de l'Est	42	(6,6 %)

Au palmarès des 10 titres les plus consultés sur le continent africain, on retrouve 5 bases de données agricoles : Agris, CAB Abstracts, Sésame, Tropag & rural et Agricola.

L'action de certaines institutions du Nord et de certains organismes de financement a été décisive dans l'essor du CD-ROM en Afrique francophone : Le Centre technique de coopération agricole et rurale (CTA), émanation de la convention ACP/CEE de Lomé avec son programme d'installation de CD-ROM qui couvrait déjà 25 centres ACP de 1989 à 1991 et qui a porté son concours financier à différents séminaires et ateliers sur le CD-ROM, ainsi qu'aux projets d'évaluation des sites. Avec ce programme, les bases de données agricoles les plus importantes du monde ont été mises à la portée des centres de documentation participants .

La coopération française, et principalement le CIRAD de Montpellier a assuré la diffusion gratuite de SESAME, le seul référentiel francophone sur l'agronomie tropicale. La BIEF, programme décentralisé de l'ACCT a été instrumentale quant à l'installation des lecteurs de CD-ROM dans les bibliothèques nationales des pays participants dès 1990. Au côté des bibliothèques universitaires, on note la présence des Centres SYFED de l'AUPELF-UREF qui offrent une gamme variée de bases de données sur CD-ROM à la consultation. Un programme d'aide à l'accès aux documents primaires est inclus dans les prestations des Centres SYFED.

L'une des questions à se poser aujourd'hui est celle du financement ultérieure des initiatives citées ci-dessus lorsque l'appui des bailleurs de fonds aura cessé. Déjà, le rapport Deschâtelet fait ressortir que sur 240 répondants en Afrique, seuls 49 sites disposent d'un budget d'acquisition de titres de CD-ROM.

S'agissant de l'utilisation du CD-ROM en Afrique, le rapport indique les activités ci-après :

Formation	46,2 %
Démonstration	46,2 %
Recherche d'information factuelle	58,5 %
Recherche d'information numérique	24,4 %
Vérification bibliographique	71 %
Catalogue	20,2 %
Compilation de bibliographies	31,2 %
Consultation de documents en texte intégral	31,3 %
Autres	4 %

Notre expérience de la plupart des sites en Afrique francophone nous amène à nuancer ces statistiques d'autant que, pour certains centres, l'utilisation ne dépasse pas encore le stade de la simple démonstration. Il apparait qu'après 4 à 5 années d'utilisation du CDROM en Afrique francophone, le moment soit arrivé de définir de nouveaux modes de gestion de ce service afin qu'il profite réellement au monde agricole.

Enfin, en dehors de SESAME auquel participent certains centres de documentation africains (ISRA au Sénégal par exemple) et d'AGRIS de la FAO qui bénéficient des entrée des centres nationaux participant à cette base de données coopérative, il conviendrait que les centres de production et de diffusion de l'information agricole en Afrique francophone deviennent également des éditeurs de CD-ROM où des données spécifiques au monde agricole africain soient stockées.

La Télématique en Afrique Francophone – La situation désastreuse de la plupart des réseaux de télécommunication africains est connue. A cela s'ajoutent les surcoûts occasionnés par des équipements vétustes et des systèmes de télécommunication le plus souvent hérités de l'époque coloniale qui n'avait pas prévu l'interconnection au niveau régional. Ainsi, une communication téléphonique de Dakar (Sénégal) à Lusaka (Zambie) par exemple, se doit d'être acheminée via Banjul (Gambie) et Londres (R.U.).

Des améliorations manifestes sont toutefois en cours au niveau de différentes régions africaines. Des projets initiés par l'Union Postale africaine tels que RASCOM (par exemple) sont porteurs d'espoir et ne décollent pas encore faute de moyens.

Dans le domaine de la télématique des initiatives sont prises aujourd'hui par des opérateurs extérieurs à l'Afrique qui tendent à reduire la marginalisation dont le continent est l'objet dans cette nouvelle ère des autoroutes de l'information. Ces initiatives, souvent basées sur l'utilisation de technologies simples et à coûts modérés sont principalement le fait d'organismes français ou francophones tels que l'ORSTOM et l'AUPELF-UREF. Le CRDI, en finançant le projet CABECA initié par le PADIS basé à Addis Abeba en Ethiopie contribue au décloisonnement progressif des pays africains. On peut juste regretter qu'à ce jour, ce projet ne s'im-

plante effectivement que dans quelques rares pays africains francophones.

Le Rio (Réseau Intertropical d'ordinateurs) de l'ORSTOM – Il s'agit d'un réseau de Communication électronique reliant un millier d'utilisateurs dans une douzaine de pays dont 10 pays d'Afrique francophone. Rio associe des organismes de recherche scientifique ou d'aide au développement tels que le CIRAD de Montpellier, l'ISRA (Dakar), le CORAF (collectif pour la recherche agronomique francophone) et constitue un moyen privilégié d'accès à la recherche et à l'information agricole francophones.

Parce qu'il est basé sur le protocole TCP/IP d'Internet, RIO met les services de ce méta serveur mondial à la portée de ses utilisateurs. Le réseau de l'ORSTOM utilise les techniques de télécommunication en différé et des méthodes de compression de données pour assurer un service fiable et payant .

On notera que les 10 pays d'Afrique francophone ayant accès au Rio sont ceux disposant de centres de recherche de l'ORSTOM et que peu de structures nationales se sont équipées pour profiter des services du réseaux de l'ORSTOM.

Les Centres et Points SYFED de l'AUPELF-UREF – Les Centres SYFED (10 au total dont 8 en Afrique) et les points SYFED (une centaine en Afrique) utilisent les réseaux de transmission de données par paquets (de type x 25) installés dans les pays africains francophones pour favoriser l'accès à l'information scientifique et technique francophone. Dotés de terminaux Vidéotex ou d'un micro-ordinateur associé à un lecteur de carte à mémoire, les centres et points SYFED sont principalement installés dans les Universités et Centres de recherche qui bénéficient de crédits d'utilisation (prise en charge par l'AUPELF/UREF des coûts de traffic avec des serveurs prédéfinis) et d'accès aux documents primaires.

L'AUPEL-UREF s'achemine actuellement vers une interconnexion

de son réseau SYFED avec des réseaux internationaux (INTERNET), via le réseau national français de télécommunications de la Recherche (RENATER) ou le RIO. C'est dans cette perspective qu'est né le projet REFER (Réseau Electronique Francophone pour l'Enseignement Supérieur et la Recherche). Un prototype de ce projet est en cours de réalisation dans le secteur agronomique et vétérinaire.

Le Projet CABECA de Padis – Communication in Africa) utilise des technologies de télécommunication bon marché pour assurer la liaison électronique des pays africains. Basé sur le protocole FIDONET, d'obédience angolo-saxonne, le projet CABECA vise la constitution en Afrique même d'une masse critique d'opérateurs spécialisés dans les liaisons électroniques.

A ce jour, une trentaine de pays africains bénéficient du projet dont une infime proportion en Afrique francophone.

L'intérêt du CABECA est qu'il vise la constitution au niveau national d'un pool d'utilisateurs, autour d'un point focal national relié au serveur basé à Addis-Abeba. Ce pool d'utilisation devraient à terme assurer la pérennité du système en partageant les coûts. Les services actuellement offerts par le projet sont surtout la messagerie électronique.

Au total, la télématique en Afrique progresse grâce à des initiatives isolées et souvent extérieures au continent. Bien que peu de centres nationaux de documentation agricole soient directement connectés à ces réseaux électroniques, ils peuvent y accéder soit par des points focaux, soit par des centres serveurs. En Afrique francophone, l'accès à l'information agricole via les liaisons électroniques semble devoir se développer avec les projets RIO et REFER. Le faible niveau d'implication des nationaux dans ces projets pourrait constituer à terme des freins à leur essor.

Conclusions sur les Nouvelles Technologies dans les Centres et

Systèmes de Documentation – Les nouvelles technologies sont bien présentes dans les centres et systèmes de documentation agricole des pays d'Afrique francophone. Elles le sont sous forme de fichiers développés localement sur micro-ordinateurs, de banques et bases de données disponibles sur CD-ROM ou accessibles via des serveurs potentiels. A y regarder de près, on pourrait penser à un "déluge" d'information agricole, tant les capacités d'accès ont été décuplées ces dernières années.

Toutefois, au regard de la piètre performance de l'agriculture africaine depuis les indépendances (1960) et en considérant les modalités de production et de diffusion de l'information agricole, on peut se demander si ce déluge d'information n'a pas été un des éléments déterminants. En d'autres termes, l'information agricole fournie a-t-elle correspondu aux besoins réels ? A-t-on opéré les tris et synthèses nécessaires ? Pour répondre à ces questions, nous nous proposons de considérer deux facteurs clés des systèmes nationaux d'information agricole tels qu'ils ont fonctionné depuis trente ans en Afrique francophone : les professionnels de l'information agricole (documentalistes, bibliothécaires, et vulgarisateurs) d'une part, et les structures de production de l'information agricole d'autre part.

Les Professionnels de l'Information Agricole

Profil – Le personnel en charge de l'information agricole se compose globalement de bibliothécaires et documentalistes ayant reçu une formation dans une école de bibliothéconomie, et de techniciens et ingénieurs spécialisés dans une discipline agronomique et formés sur le tas aux techniques documentaires.

Dans la plupart des pays, la proportion de professionnels de l'information agricole est la plus élevée, certes, mais on assiste à un manque cruel de personnel suffisament formé en documentation agricole. La raison en est qu'il n'existe pas au niveau francophone de formation spécifique en documentation agricole soit dans les écoles soit dans les universités.

La répartition du personnel en terme de niveau est également éloquente. Ainsi, au Cameroun par exemple, en 1992, les 67 personnes en poste dans 10 structures de documentation agricole étaient composées de :

Niveau Doctorat ou Maitrise   4

Niveau Intermédiaire (Bac + 3)   10

Niveau Baccalaureat ou inférieur 53

Au Sénégal, l'enquête menée en 1990 par le RESAGRIS (Réseau de documentation agricole du Sénégal) relève 47 professionnels de l'information agricole dont 15 de niveau aide-documentaliste, 24 de niveau 1er cycle de l'Ecole des Bibliothècaires et Archivistes et Documentalistes de Dakar et 8 de niveau 2e cycle de cette même école.

Au Togo, la stratification est encore plus marquée. Sur 34 professionels on compte 11 de niveau BEPC, 19 de niveau BAC, 3 de niveau Bac + 3 ans et 1 niveau Bac + 5 ans.

Compte tenu de leur profil multiforme, les professionnels de l'information agricole bénéficient rarement d'un statut clairement défini. Ils n'occupent pratiquement pas de postes de responsabilité et expriment constamment des besoins importants de formation et de perfectionnement.

Besoins de Formation et de Perfectionnement – Les besoins les plus souvent exprimés ont trait à trois disciplines :

- l'informatique documentaire : ce besoin est exacerbé par l'informatisation continue des structures et aussi par le fait que cette matière n'a souvent pas été (ou si peu !) enseignée dans les écoles de formation. Toutes les trois catégories de professionnels sollicitent cette formation ;
- les techniques documentaires: ce besoin est exprimé par le personnel intermédiaire (aide documentalistes, techniciens) et de façon marginale par des agronomes et techniciens d'agriculture ;
- gestion des centres de documentation, en particulier le marketing des services d'information agricole. C'est surtout le personnel de catégorie supérieure qui exprime ce besoin.

On notera que ces besoins sont souvent pris en compte dans les programmes de formation de certaines institutions telles que l'ACCT/EIB, la FAO, le CTA. Ce dernier avait demarré en 1990 un audacieux programme général de formation en information agricole (PROGEFIA).

Les Professionnels et Leur Environnement – Parce qu'ils ont des statuts insuffisamment définis, et qu'ils occupent rarement des postes de responsabilité, les professionnels connaissent généralement une mauvaise appréciation de leurs services ainsi que de leurs capacités. La réalité est qu'ils s'enferment le plus souvent dans les tâches techniques de leur métiers et sont peu orientés vers la satisfaction des demandes des usagers. Un article publié dans le bulletin du Centre universitaire de Dschang au Cameroun (UCD Resources, Vol. 1, No. 1, March 1989) est assez symptomatique de cette situation. A la question régulièrement posée par les usagers de l'Université agricole, à savoir "Qu'est-ce-qu'ils font même à la Bibliothèque ?", l'un des professionnels de la bibliothèque centrale n'a trouvé mieux que de repliquer par un article au titre évocateur !" *Derrière les rideaux de la bibliothèque*. Il y décrit minutieusement toutes les phases (et peines !) du catalogage et conclue que "nul n'entre derrière le comptoir de la bibliothèque s'il n'est géomètre" !

Les professionnels de l'information en Afrique francophone vivent en général une frustration permanente et sont toujours en attente d'une meilleure opportunité de postes.

L'Information Agricole et ses Structure de Production: de l'Inadequation a l'Inefficacite

Inadéquation de l'information Agricole – L'information agricole proposée par les professionnels en Afrique francophone a foncièrement trait à la documentation écrite. Cette documentation est péniblement produite dans les systèmes nationaux de recherche agronomique. Elle provient de l'extérieur pour une grande partie (90 %). Les quelques rares études réalisées par des nationaux ont une circulation très restreinte. Les modes de diffusion de cette information sont à travers les services questions/réponses, la production de bibliographies et de bulletins d'acquisitions, les photocopies et/ou la communication du document primaire.

Les destinataires supposés de cette information sont variés :

• Les chercheurs: peu de pays leur accordent l'importance qu'ils méritent, les budgets de la recherche étant reduits à une portion congrue (les dépenses de recherche-développement en pourcentage du PNB sont de 0,36 % en Afrique, pour 1,18 en Asie, 1,79 en Europe et 2,33 en Amérique du Nord). Le résultat en est une sous-utilisation de l'information agricole.

• Les vulgarisateurs: ils sont en contact direct des usagers finaux que sont les paysans, mais sont en décalage permanent entre les techniques nouvelles conseillées et les savoirs traditionnels. Il se pose également à eux le problème de la langue de communication (le français pour la plupart) et celui d'une information agricole rarement synthétisée et préalablement digérée.

• Les pays: leurs avis comptent peu. Ils sont analphabètes (ne lisent pas le français) pour la grande majorité et comptent davantage sur les techniques traditionnelles leguées par les ancêtres.

• Les ONG: Elles prennent de plus en plus le relais de l'Etat auprès des collectivités locales et n'hésitent pas à "pénétrer dans la brousse". Elles sont basés pour la plupart à l'extérieur et sont organisées pour accéder à l'information à partir de sources extérieures. Certains d'entre elles se sont engagées dans des projets favorisant le développement à la base.

Au total, l'information agricole, telle qu'elle se présente aujourd'hui ne peut jouer son rôle de catalyseur du développement en Afrique francophone. Mais en fait, l'inefficacience ainsi relevée de l'information proposée est également à relier à d'autres phénomènes : le manque de politique agricole clairement définie et l'inadéquation des structures de gestion de l'information.

Causes structurelles de l'inefficacité – Les centres de documentation du secteur agricole et rural représentent en moyenne 30 % du secteur documentaire national. La plupart de ces structures sont situés dans les centres urbains. Les collections documentaires sont logées dans des espaces exigus et le manque de budgets ne permet pas des acquisitions permanentes.

L'introduction des nouvelles technologies (micro-ordinateurs principalement) dans les années 80 et l'impulsion données par des organismes extérieurs ont amené le développement de réseaux nationaux de documentation agricole. On en compte une dizaine aujourd'hui en Afrique francophone dont les activités, principalement basées en zones urbaines, tournent autour de la mise en oeuvre d'outils communs tels que les catalogues et repertoires nationaux, les bases de données coopératives et l'organisation de séminaires de formation.

Si les réseaux nationaux constituent un creuset d'organisation des professionnels, leur apport dans la diffusion effective de l'information agricole reste à démontrer. Dans certains cas, les activités du réseau peuvent prendre le pas sur celles du service du participant, accentuant sur le coup la mauvaise perception du role du centre de documentation au sein de l'institution mère.

En définitive, que ce soit les centres de documentation agricole ou les réseaux nationaux, le mode de fonctionnement de ces structures apparait trop techniciste et quelque peu nombriliste. Peu de contacts sont développés avec les chercheurs et leurs propres réseaux de recherche et peu d'efforts sont faits en direction des usagers finaux qui demeurent à mille lieux de ces structures. Il faut reconnaître qu'au delà de cette inéfficacité structurelle, c'est tout le système national qui reste à évaluer, en termes de politique agricole clairement définie, de besoins en information agricole bien ciblés, et de mécanismes de collecte et de diffusion de l'information bien dimensionnés. Le rôle des nouvelles tehnologies devra agalement être mieux défini dans cette perspective.

Pour une Meilleure Diffusion de l'Information Agricole en Afrique Francophone: Le Role des Nourvelles Technologies

Quelle Information Agricole en Afrique en l'An 2000 ? – Les nouvelles technologies offrent des outils pour l'amélioration de la gestion de l'information agricole en Afrique. Le risque, ainsi que nous l'avons vu plus haut, est que ces nouvelles technologies ouvrent la voie à des quantités trop grandes et indigérables d'information. Et comme l'estime Ballantyne (1992), "Les petits pays ont besoin de systèmes qui leur fournissent une information spécifique, voire même condensée, qui ne surchargera pas leur capacité internet." (Ballantyne, 1992). Le dimensionnement des mécanismes de collecte et de diffusion de l'information dans le cadre d'une politique agricole définie devra prendre cette réalité en compte. De même, il devra épouser les contours de l'information agricole specifique à l'Afrique en l'an 2000.

L'information agricole en Afrique en l'an 2000 sera marquée par les facteurs suivants (Dandjinou P., 1992) :

• un décloisonnement exigé par une demande en information plus complexe et plus spécialisée ;
• le développement de nouveaux thèmes tels que l'environnement et l'écologie ;
• l'apparition de nouveaux usagers, due à l'éclatement des structures documentaires traditonnelles suite au désengagement progressif de l'Etat ;
• l'usage intensif des nouvelles technologies, notamment le multi-média entrainera la décentralisation des activités vers les zones reculées.
• une forte participation à de multiples réseaux sectoriels d'information exigée d'une part par le souci et la logique de l'intégration économique africaine et d'autre part par la croissance exponentielle des sources et ressources d'information au niveau mondial.

Comment faire pour que l'utilisation des nouvelles technologies améliore effectivement la circulation de l'information agricole ainsi définie et par ricochets une meilleure perception du rôle des professionnels ? Telle est la problématique actuelle en Afrique francophone.

Quelles Nouvelles Technologies pour Quelles Utilisations ? – Les nouvelles technologies sont aujourd'hui présentes en Afrique sous différentes formes. Elles ont été introduites dans les structures de documentation agricole par le biais de projets et de financements extérieurs. La baisse constante des coûts d'acquisition ne peut qu'entraîner une informatisation accrue en Afrique francophone, nonobstant la dévaluation du francs CFA en 1992 et la diminution du pouvoir d'achat. Certaines de ces technologies nous paissent devoir jouer un role particulier dans l'amélioration de la diffusion de l'information agricole.

Les Micro-ordinateurs – De plus en plus populaires, les micro-ordinateurs ont déjà permis de construire des bases de données agricoles, de réaliser des bibliographies et bulletins et d'opérer des échanges d'information sous forme de disquettes souples. La généralisation de l'utilisation locales et les zones rurales favorisent l'échange de données entre structures nationales et locales, pour peu que les modalités en soient clairement définies. Des micro-ordinateurs dans les campagnes et au sein des groupements villageois ne pourront que rapprocher les paysans des ressources d'information en amont. Parallèlement, les ressources d'information locales basées sur les savoirs paysans pourront être mieux accessibles et mieux exploitées.

Le CD-ROM – Particulièrement adapté à l'environnement africain, le compact disque ouvre de grandes perspectives puisqu'il met des millions de références bibliographiques à la portée des chercheurs. Le stockage sur dique optique des documents en texte intégral sera particuièrement approprié dans des pays où l'accès au document primaire est handicapé par divers facteurs : budgets d'acquisition en nette regression ; difficultés d'accès aux devises étrangères ; delais d'acheminement élevés et risque de pertes fréquents.

Les bailleurs de fonds ne s'y sont pas trompés, qui investissent massivement dans le développement du CD-ROM en Afrique. Il conviendra de procéder à un "reconditionnement" de la grande masse d'information rendue disponible afin qu'elle corresponde effectivement aux besoins locaux. De plus, avec le CD-ROM, c'est à terme la diffusion en retour des informations produites en Afrique même qui est mise en perspective.

La Publication Assistée par Ordinateur (P.A.O.) – Cette technologie allie les avantages de l'ordinateur aux capacités de photocomposition, de graphisme et d'édition. Elle favoriserait la réalisation et la bonne présentation ainsi que la grande dif-

fusion des bulletins d'information, des catalogues bibliographiques et surtout de plaquettes de promotion.

Certes, les ressources et surtout la disponibilité requises pour maîtriser cette technologie peuvent quelquefois être au delà des capacités des professionnels, mais l'existance d'une structure de publication assistée peut améliorer et accroître la collaboration entre chercheurs et documentaliste agricoles. L'intérêt de la publication assistée par ordinateur dans les structures de recherche agricole avait déjà été mis en exergue en 1989 par un rapport du BOSTID (Board on Science and Technology for International Development, de l'U.S. National Research Council). L'expérience réussie de l'ISRA (Institut Sénégalais de la Recherche Agronomique) mérite d'être soulignée car elle permet à l'institut de diffuser tous les dix jours des bulletins d'information statistiques sur la pluviomètrie, le sols et les conditions générales de l'activité agricole, après que ces données aient été recueillies par les stations régionales.

Les Liaisons Électroniques – L'importance des télécommunications pour le développement africain n'est plus à démontrer. D'après Fitzgerald. P. (1989), "des moyens de communication efficients ont un effet catalyseur sur le développement économique et les pays qui n'ont pas de bons systèmes de communications sont nettement désavantagés. Avec le rôle accrû que jouent les réseaux d'ordinateurs dans l'économie mondiale, les télécommunications prennent une nouvelle importance. Cette assertion est vérifiée en Afrique plus qu'ailleurs."

Et Georges Henault (1989) de renchérir : "Le rôle des télécommunications dans les pays du tiers monde peut s'avérer proportionnellement plus important (en comparaison avec les pays développés), dans son impact sur le développement."

Il faut espérer que les initiatives de liaisons électroniques en Afrique, francophone trouvent un appui

local. Ceci passera par la sensibilisation des pouvoirs publics à travers des activités de promotion. Ainsi, des projets d'envergure, supportés par des budgets nationaux et dont l'objectif principal serait de décloisonner le secteur rural verraient le jour. L'on devra également résoudre le lancinant problème du coût prohibitif des télécommunications en Afrique francophone, d'autant que par ailleurs, en Afrique australe par exemple, l'essor actuel des liaisons électroniques au sein de la SADC (South African Development Community) est largement dû à la modicité des coûts.

Les potentialités des nouvelles technologies étant ainsi inventoriées, on devra s'intéresser aux médiateurs de l'information agricole en Afrique francophone.

La Nécessaire Évolution du Métier de Professionnel de l'Information Agricole – Le métier de professionnel de l'information est foncièrement marqué par l'introduction des nouvelles technologies en Afrique. Afin de susciter, les professionnels devraient désormais s'inscrire dans une logique privilégiant :

• l'acceptation d'une mutation psychologique et professionelle ;

• l'adaptabilité aux nouvelles technologies ;

• l'appropriation des nouvelles technologies.

Les Mutations Psychologiques et Professionnelles – Les professionnels devront se convaincre que leur métier change de jour en jour et que les schémas classiques appris dans les Ecoles de formation n'offrent pas la panacée.

Tout comme les autres métiers de l'information, celui des documentalistes, bibliothécaires et archivistes ne peut qu'évoluer et se complexifier. Avec l'apparition de nouveaux usages, et donc de nouveaux besoins, les cibles doivent être redéfinis. Sans négliger le monde de la recherche gronomique, il apparaît que les opérateurs économiques ainsi que les paysans devront faire

l'objet d'une attention particulière. La réalisation de nouveaux produits, l'invention d'autres modes de diffusion ainsi que la commercialisation des services seront de mise.

L'on devrait assister à la naissance d'une autre catégorie de professionnels: ce seront des documentalistes communicateurs, ou encore des documentalistes facilitateurs (ou médiateurs). S'agissant du monde de la recherche, les documentalistes devront s'y intégrer en s'engageant si possible dans les projets de recherche, ainsi que le recommande Peter Ballantyne. En effet, leur formation leur permettra(it) de localiser et d'acquérir l'information, plutôt que de la traiter et de l'archiver." (Ballentyne, 1992)

L'Adaptabilité et Appropriation des Nouvelles Technologies – Il importera que les professionnels fassent preve d'une grande capacité d'adaptation aux nouvelles technologies. Il s'agit de prendre conscience de l'impact de technologies sur leur métier et de s'y faire, au risque d'être évincés. Kharim Cissé (et al, 1992) le disent si bien dans leur communication à la table ronde des bibliothécaires et documentalistes agricoles des pays d'Afrique francophones organisée par l'IAALD à Bordeaux. En effet, estiment-ils, "les technologies de l'information placent les professionnels devant le choix suivant : se les approprier pour développer voire étendre leur champ d'action, rehausser leur image et survivre, ou assister en simples spectateurs à l'utilisation de ces technologies par d'autres avec le risque de les voir s'approprier leur spécialité, de donner l'image d'une profession incapable d'évoluer et donc à terme de disparaître." (Cissé and Gay, 1992)

S'approprier les nouvelles technologies passera en amont par la refonte des contenus de la formation initiale dispensée dans les établissements de formation ; en aval, le professionnel devra subir un perfectionnement permanent et une exposition ininterrompue aux nouvelles technologies. Ceci se fera par la

participation aux salons et manifestations professionnels d'une part, et la "veille technologique" assurée par l'information permanente sur les nouvelles technologies via les revues spécialisées d'autre part.

Conclusion

Au total, les nouvelles technologies sont présentes dans les Centres et systèmes de documentation agricole de l'Afrique francophone. Elles y ont déjà permis la gestion quotidienne de bases de données bibliographiques, la constitution de réseaux nationaux de documentation agricole, ainsi que les échanges de données avec des institutions des pays développés. Des masses importantes d'information sont rendues ainsi disponibles, mais demeurent encore inaccessibles pour la grande majorité des usagers potentiels. Afin d'y parvenir, il conviendra d'inscrire les activités de gestion et de diffusion de l'information agricole dans une politique de développement agricole bien définie. Cette politique devra prendre en compte les besoins réellement exprimés par les usagers finaux, la nécessité d'un éclatement des structures de collecte et de difusion de l'information et enfin, la disponibilité de professionnels de type nouveau. Ces professionnels devront être acquis aux nouvelles technologies et plus ouverts au monde de la recherche agricole et aux usagers nouveaux que sont les opérateurs économiques et les paysans.

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PIERRE DANDJINOU is with the Département de Ian Banque de Données, CICIBA.

CONTACT ADDRESS:

Pierre Dandjinou
CICIBA
B.P. 770
Libreville
GABON
Phone: +241-736-347
Fax: +241-739-717

Concurrent Session 1

Communication — Les Bases et Les Banques de Données Agricoles au Sahel:

Analyse de la Situation, Perspectives del Valorisation dans le Cadre du Développement durabel et Intégré de la Sous-région

Samba Aw

ABSTRACT: A study shows that in the Sahel region which is the poorest region in Africa, agricultural data bases and databanks are often created without preliminary analysis, and sometimes without responding to clearly defined and expressed needs. The study reveals that 80% of these databases are under-utilised or difficult to get access to; and that the agricultural CD-ROM databases available in the region are not often consulted. These databases however should be able to play an important role in the development of a sustainable and integrated system in the region. The following should be favoured: cooperation with other development partners, installation and utilisation of networks and an integrated agricultural information system for West Africa with national focal points to manage the dissemination and collecting systems, use of common standards, consolidation of telecommunication networks and expertise development.

RESUMÉ: Une étude a révélé qu'au Sahel qui est la région la plus pauvre d'Afrique, les bases et banques de données agricoles sont créées souvent sans étude préalable, et quelquefois sans répondre à un besoin réellement cerné et exprimé. L'étude révèle que 80% de ces bases de données sont sous-utilisées ou difficiles d'accès, et que les bases internationales agricoles sur CD-ROM, disponibles dans la région, sont peu consultées. Pourtant celles-ci devraient pouvoir jouer un rôle important dans le développement

d'un système durable et intégré de la sous-région. Il faudrait alors favoriser : une coopération concertée avec les partenaires au développement, la mise en place et l'utilisation de réseaux et d'un système d'information agricole intégré ouest-africain, avec des centres d'excellence nationaux gérant des systèmes de diffusion et de collecte, l'utilisation de standards communs, la consolidation des réseaux de télécommunication et la formation d'une expertise.

RESUMEN: Un estudio indicó que en la región del Sahel la región más pobre de Africa las bases de datos y los bancos de datos agrícolas se crean a menudo sin haber realizado un análisis preliminar y, por tanto, éstos a veces no responden a unas necesidades claramente definidas y expresadas. El estudio no sólo indicó que el 80% de estas bases de datos se subutilizan o son difíciles de accesar, sino también que es poca la consulta que se hace a las bases de datos agrícolas en CD-ROM disponibles en la región. Sin embargo, estas bases de datos podrían desempeñar un papel importante en el desarrollo de un sistema sostenible e integrado en el Sahel. Se debe prestar atención a los siguientes aspectos: participación en actividades colaborativas con otros co-partícipes del proceso de desarrollo; instalación y utilización de redes, y creación de un sistema de información agrícola integrado para Africa Occidental, con centros nacionales para administrar los sistemas de difusión y recolección de información; uso de normas comunes; consolidación de redes de telecomunicación; y formación de expertos.

Introduction

Context Sahélien – Le Sahel est la partie septentrionale de l'Afrique de l'Ouest. Il est considéré comme une zone distincte à cause de ses problèmes particuliers identifiés en 1975 qui ont pour nom : sécheresse, désertification, déficit agro-alimentaire.

Neuf pays regroupés dans le Comité Inter-Etats de Lutte contre la Sécheresse dans le Sahel (CILSS) créé en 1973 constituent aujourd'hui le Sahel. Ces pays sont : le Burkina Faso, le Cap-vert, la Gambie, la Guinée-Bissau, le Mali, la Mauritanie, le Niger, le Sénégal et le Tchad.

Ces neufs pays comptent 45 millions d'habitants et couvrent une superficie totale de 5,4 millions de Km2, dont 14 millions d'hectares emblavés, produisant plusieurs millions de tonnes de céréales (aliment de base au Sahel) par an.

Le Sahel est considéré comme une des sous-régions les plus pauvres du monde. Le P.N.B. y varie de 100 à 500 $ US selon les Etats. Dans le cadre d'une réflexion prospective qui a été menée par le club du Sahel et le CILSS, on a conclu que le processus de développement du Sahel est devenu plus difficile.

En effet, la majeure partie des grandes tendances défavorables constatées, en 1975 n'ont pas été renversées. D'autres déséquilibres nouveaux se sont ajoutés à ceux qui ont été identifiés. Aussi, le Sahel se caractérise-t-il aujourd'hui par : un climat relativement hostile, une géographie difficile, une insuffisance et un manque de valorisation des ressources naturelles, une explosion démographique, le surpâturage et le déboisement inadéquat, une sous-utilisation de la technologie, une urbanisation excessive, un endettement massif, une crise des systèmes de valeurs, une dépendance alimentaire, une inadéquation entre la croissance économique et la croissance de la population qui est de + 2,5% par an.

Les Economies globales des pays sahéliens vont au rythme de leur secteur agricole. l'écrasante majorité de la population est rurale et plus de 80 % de la population active est employée par l'agriculture (Productions végétales et animales au sens large). Dans le contexte actuel de dépendance générale et surtout d'endettement, l'importance de l'agriculture ressort d'avantage, si on analyse la structure des importations, dont elle compte pour plus de 57 % de la valeur. C'est dire donc, que le développement de cette agriculture est un défi important à relever dans la perspective d'une relance économique durable.

Les Besoins en Information Scientifiques et Techniques Agricoles au Sahel – L'information scientifique et technique est ici un élèment important pour le fonctionnement des sous-secteurs cibles que sont: la recherche agronomique, la vulgarisation, la planification, la formation agricole et la prise de décisions.

Pour la maîtrise de cette information, on a de plus en plus tendance à utiliser comme partout dans le monde, l'outil informatique, avec la création de bases et de banques de données agricoles, l'accès par des réseaux de télécommunication, des réseaux électroniques, des "réseaux

de réseaux" comme Internet, la Technologie du disque compact à des bases et banques de données extérieures. L'étude des besoins en information agricole en Afrique de l'Ouest, menée en 1992 par le Centre Technique de Coopération Agricole et Rurale avec la collaboration de la Communauté Economique des Etats de l'Afrique de l'Ouest montre dans ses conclusions que :

• L'acquisition et la diffusion de l'Ist agricole sont cruciales pour une plus grande efficacité de la recherche agronomique. Les faibles performances de la recherche sont dûes en partie à un flux inadéquat d'informations appropriées et à un acccès difficile à certains résultats;

• La création de liaisons solides et étroites entre la recherche et le développement à travers des systèmes d'information-vulgarisation est nécessaire;

• Un besoin important d'accès rapide à l'information pertinente se fait sentir pour les décideurs et pour la formation;

• Les unités documentaires et les bibliothèques ont des besoins énormes pour être performantes: besoins d'information, de cadres d'échange appropriés, d'outils méthodologiques, d'expertise, de matériel et de technologies de stockage et de diffusion;

• Une masse importante d'information agricole a été produite.Il existe un besoin réel de rassembler ces gisements d'informations et de les rendre facilement accessibles à travers des bases et banques de données;

La présente étude sur les bases et les banques de données agricoles au Sahel peut être inscrite dans le processus d'organisation de l'IST agricole en Afrique de l'Ouest entamé par le CTA avec la collaboration de quelques partenaires comme le CRDI et la CEDEAO.

La Méthodologie de l'Etude – Pour mener cette étude diagnostic au Sahel débouchant sur des recom-

mandations deux procédures ont été mises en oeuvre:

Deux enquêtes exploratoires : La première a été menée entre Février et Avril 1994.Elle a permis de localiser dans tous les pays du Sahel les institutions publiques, parapubliques, privées et de coopération susceptibles de posséder et de gérer des bases et des banques de données. Deux types de questionnaires (un qui permet l'analyse les systèmes nationaux de télécommunication et un sur les bases et les banques de données)ont été produits, testés sur un échantillon et administrés par des Equipes d'enquêteurs auprès des différentes institutions ciblées.

Lors de la collecte des données (Mai-Juin-Juillet 1994) l'approche intégrée, interview/questionnaire a été utilisée.

La plupart des questions étaient fermées et servaient à recueillir des données sur :

• Les bases et les banques de données : identification (nom localisation, date de création, domaines couverts, taille), matériel utilisé pour la gestion, condition de maintenance et de protection, niveau et formation du gestionnaire, mode de diffusion, problèmes, contraintes et perspectives, taux de bruit et de silence, point de vue des utilisateurs;

• Les télécommunications nationales : identification (nom, localisation, date de création, statut, historique) organisation, moyens (humains, financiers, logistiques), activités télématiques (transmission de données par paquets), coopération.

Rassemblement et Exploitation de la documentation existante : Pendant que la collecte s'effectuait sur le terrain, un travail d'investigation et de rassemblement d'un corpus de la documentation existante (rapports, ouvrages, articles de périodiques, notes techniques, mémoires) a été mené.

Les données relatives au secteur agricole ont été extraites et analy-

sées pour dresser un état des lieux et dégager des recommandations qui nous semblaient les plus pertinentes.

Les concepts majeurs ont été préalablement définis pour guider l'enquête et l'analyse des agrégats recueillis. C'est ainsi que dans cette étude, nous entendons par base, un fichier contenant des données bibliographiques et par banque un fichier contenant des données factuelles.

Analyse de la Situation des Bases et des Banques de Données Agricoles au Sahel

Il ressort de la synthèse des analyses par pays les constats suivants :

Situation: analyse quantitative et institutionnelle – La plus ancienne base de données agricole au Sahel date de 1971 . C'est celle de l'OMVS. Elle était exploitée sur un gros ordinateur. Il a fallut attendre les années 1980, pour voir avec la vulgarization du micro-ordinateur, un début timide de création dans plusieurs institutions.Depuis 1990, ces bases ont commencé réellement à proliférer, avec l'utilisation tout azimut dans tous les secteurs de l'outil informatique et la mise en place de réseaux de transmission de données par paquets dans la sous-région.

Ponctuellement, les bases bibliographiques qui posent aussi un problème d'accès aux documents primaires, sont plus nombreux que les banques.Depuis 1992, la tendance est renversée. Ce sont surtout des banques de données factuelles qui sont créées.

Les bases existantes ne sont pas suffisament importantes ; les 80 % n'atteignent pas 1000 références. Aucun indicateur ne montre la pratique du télédéchargement dans une seule institution (down loading) Pour renforcer le nombre de références des bases de données. La raison principale évoquée pour expliquer cela est le problème de compatibilité. Pourtant, certaines institutions possèdent le CD/ROM et dans certains pays (Sénégal, Mali, Niger,

Burkina Faso, Tchad, Guinée-bissau), les réseaux de Télécommunication permettent un accès aux données extérieures.

Quelques rares bases et banques sont acquises à l'extérieur sur des supports disquettes (Ex. La banque sur les arbres et arbustes à usage multiple ou Multipurpose tree and Shurb database qu'on retrouve à l'Institut du Sahel (RESADOC) et dans les centres- serveurs du sous-réseau INFODOC-Salwa : INRAN, Isra-DRPF,IER, CNRST; La base sur les programmes et projets de recherche en cours du SIS-SPAAR et la base IDRIS du CRDI diffusées sur disquettes installées déjà au Centre régional de coordination du RESADOC).

Les bases et banques agricoles sont présentes dans les institutions suivantes : Ministères de l'Agriculture, de l'environnement ou du développement rural (dans tous les pays du Sahel), systèmes nationaux de recherche agronomique et agro-alimentaire (Ex. ITA au Sénégal, IER au Mali, Institut du Sahel, INIDA au Cap-Vert, CNRADA en Mauritanie, Instituts et facultés de formation agricole (ex-Faculté d'Agronomie du Niger), Organisations non-gouvernementales (CCA-ONG au Mali, IPD-AOS au Burkina Faso), directions nationales de météorologie, d'agriculture, d'élevage, des eaux et forêts, de protection des végétaux (dans la quasi-totalité des pays du Sahel), offices de développement (OPAM, OMBEVI au Mali), bureaux nationaux ou régionaux de coopération et d'organisations internationales (Ex : FAO, USAID, CRDI, CRAT, CODESRIA, ORSTOM), Organisations sous-régionales de recherche-développement (Ex : AGRHYMET, CILSS, OMVS, ORANA).

Certaines institutions possèdent des bases et des banques de données internationales ou d'organismes de Coopération sous forme de CD-ROM consultables sur place. C'est le cas du centre régional de coordination du RESADOC (Institut du Sahel), des centres SYFED de

l'AUPEF-UREF, des centres serveurs de la BIEF, des centres de l'ORSTOM, de l'ICRISAT, de l'U-SAID, de quelques institutions nationales de recherche agronomiques, des unités documentaires de Ministères de l'Agriculture.

Ces CD-ROM ont souvent été acquis dans le cadre de l'appartenance à des réseaux documentaires ou par le projet CD-ROM du Centre Technique de Coopération Agricole et Rural (CTA). Les CD-ROM que nous avons pu recenser sont : Sesame, Agris, Caris, Agris fishries, Tropical and Rural, Cab Abstracts, Agricola, Cabpest, Resodi, biological and agricultural index, World weather disc, Electro biblio, Ciarl, Asfa (Aquatic science and Fishry Abstract), Cial BBS, Sud, Protection des plantes, CDThèque Francophonie, Dai CD-ROM, Unesco.

L'enquête n'a pas révélé l'existence encore au Sahel de vidéodisques (disque où sont enregistrés par un procédé analogique des images et du son lisibles par un procédé optique) et de CDI (compact disc interactif qui est un produit dérivé du CD-ROM permettant de stocker des données multimédias lisibles à partir d'un lecteur spécifique couplé à un poste de télévision).

La conclusion qu'on peut tirer de cette analyse quantitative et institutionnelle, c'est qu'on aurait pu avoir beaucoup plus de bases et de banques si on tient compte du nombre d'institutions potentiellement concernées.En effet, dans 445 institutions concernées au Sahel par des questions agricoles, nous n'avons identifié que 181 bases et banques de données agricoles (cf. tableau statistiques en annexe). Ce qui est infime, quant on sait qu'une institution peut en posséder plusieurs.

La base de données du RESADOC (21 000 références au 30 juillet 1994)qui pourrait être considérée comme la plus grosse du Sahel n'a pas plus de 7 000 références agricoles sur le Sahel. A titre comparatif, la base de données du CIRAD possédait au 1er août 1990 : 49 000 références agricoles.

Toutes les institutions de recherche agronomique ont chacune au moins une base de données. Cette donnée est à apprécier positivement, quand on sait que partout, la recherche est un grand consommateur d'informations scientifiques et techniques.

Nous avons observé que même si la tendance est à la création de plus en plus de banques de données factuelles, la démarche reste timide. Des possibilités de renforcement des bases existent, avec l'utilisation de plus en plus fréquente du courrier électronique (Ex. on le trouve au CSE/Sénégal, au PRISAS/institut du Sahel qui possède une banque socio-économique), la présence du réseau RIO de l'ORSTOM et du réseau international des réseaux : l'Internet.

Le contenu de la plupart des bases est en français, même dans les deux pays lusophones, Cap-Vert et Guinée-Bissau . Les bases Gambiennes (8) sont en Anglais. On trouve quelques données textuelles en anglais, portugais et Arabe (Mauritanie). C'est dire que même s'il existe, le problème linguistique ne se pose pas ici avec acuité.

Situation des Moyens Logistiques, Méthodologiques et Humains : Pour la création, la gestion et la diffusion des bases et des banques de données, on utilise du matériel informatique (ordinateurs, périphériques et autres), des logiciels, des systèmes d'exploitation et langages de programmation, des réseaux de télécommunication, des outils méthodologiques (format, bordereaux de saisie, manuel d'opérations ou règles d'écriture, liste de descripteurs ou thésaurus pour l'indexation), des gestionnaires ou administrateurs de bases et banques de données

Le Matériel Informatique – A part la base de données régionale du RESADOC (Institut du Sahel) gérée dans un mini-ordinateur HP 3 000/37 de 703 MB de disque dur, avec utilisation du logiciel minisis développé par le CRDI, toutes les

autres bases et banques de données se trouvent dans des micro-ordinateurs.

Les micro-ordinateurs: Les IBM (PS/2,PC, PC/XT, AT 286, 386, 386 SX) constituent les 70 % du parc. Les autres sont composés de : Goupil G4 et G5,Gateway 2000, DTK, Bull, Macintosh SE, Epson, Zenith, micro AST Pover preminium, RTK 2, PC brother, IN2 Siemens, olivetti M 250, HP Vectra QS/20, AST bravo, wang, Ogivar, Dell 486/P, Infogold, Samsung S 800, compudad, Toshiba T 3200. Signalons la présence dans le lot de deux RISC System 6000 (850 MO et 7 Giga de disque dur). Ces micro-ordinateurs très puissants de la famille des IBM sont utilisés au Sénégal, au Centre de recherche océanographique Dakar Thiaroye de l'Isra et au centre national de documentation scientifique et technique pour la gestion du réseau RNIST en cours d'opérationalisation.

La majorité de ces ordinateurs ont au moins 20 Mo de disque dur. Les 80 % varient entre 40 Mo et 150 Mo de disque dur et au moins 1 Mo de mémoire centrale. Les processeurs les plus répandus sont les 80286,80386, 80486. Pour des raisons de coût, donc parce qu'elle n'est pas chère, la carte VGA monochrome est la plus prisée.

Les ordinateurs avec lecteurs de 5 1/4 pouces sont les plus nombreux. Mais, la tendance est à l'acquisition de machines pourvues de lecteurs de 3 1/2 ou de doubles lecteurs (5 1/4 et 3 1/2 pouces). Jusqu'à la fin des années 90 le système monoposte sera le plus utilisé. Dans certains pays (au Sénégal en particulier) on assiste de plus en plus à la création de réseaux locaux avec des systèmes multipostes (un serveur plus trois à cinq stations).

Les imprimantes: les plus courantes sont les EPSON (LQ 1050, 1070, 1170, Fx 1050, 1060, Lx800). Ils constituent Les 55 % du stock actuel. Les HP laser jet (II,III,IV) et deskjet les 20 %. Les 25 % restant sont composés de : Nec P7, Minute Man, Pointjet XL, ALPS, Okidata,

Panasonic Printer, Imprimante star, Brother M-4018, Goupil DX 2000, Fujitsu Dx 2100, Citizen 120 DX, Wang. Dans la gamme on retrouve surtout des imprimantes à tête mobile (à aiguilles), à jet d'encre et à laser. On ne nous a pas signalé la présence d'une seule imprimante par transfert thermique ou d'une imprimante QMS.

Les onduleurs: La marque Merlin gérin sort du lot. Elle représente le 85 % du parc. Les autres marques d'onduleurs employées sont les suivantes : Umunelec, ogivar, American power conversion, UPS, Ondyne, watt power, Multipac, Sendon, Agde model SP 600, Data prof Urs, Gamma, Victron, ITN electronic, Hemerson, Best, Senvon, Saisho. Du point de vue de la capacité les plus répandus varient entre 300 et 500 KVA.

Retenons aussi que le 35 % des postes utilisés pour gérer ici des bases et des banques de données ne sont pas pourvus d'onduleurs.

Autres types de matériel: A part les micro-ordinateurs, les imprimantes, les onduleurs, le matériel suivant est utilisé, même si c'est à une échelle très réduite : tables à numériser, scanner, moniteur axion, lecteur de disque optique, streamer, modem pour courrier électronique. Ces technologies ne sont donc pas très répandues. On les trouve dans dix institutions.

Malgré l'existence de plusieurs CD-ROM, L'enquête n'en a recensé que 20 pièces dans le secteur agricole de la sous-région.

Le coût du matériel est un facteur limitant dans l'accroissement, la protection et la valorisation des bases et banques. Le matériel informatique coûte cher dans la sous-région, surtout avec l'introduction tout azimut de la TVA et la dévaluation du franc CFA survenue au mois de Janvier 1994. La tendance n'est pas à la baisse, même si, dans quelques rares pays on avait à un moment donné constaté une baisse des droits d'importation (Ex. en Mauritanie où les taxes étaient en 1990 passées de 44 à 28 %) et

même si certains projets, ONG et organisations partenaires ont la possibilité d'importer en hors taxe.

Les Réseaux de Télécommunications – Leur importance dans le cadre de cette étude n'est pas à démonter. Retenons seulement qu'elle se mesure par les possibilités qu'ils peuvent offrir pour la diffusion des données, donc pour les échanges rapides et pour la consolidation des bases et banques avec la possibilité d'accès aux informations capitalisées dans d'autres pays.

Ces réseaux existent dans tous les pays. Ils sont de plus en plus développés, parceque le monde entrera au début du 21 siècle dans "la société de l'information".

Avec les programmes d'ajustement structurel, la tendance est à les privatiser. Cette nouvelle situation aura probablement une incidence sur les prix et les gammes de services qu'ils vont offrir et certainement sur la modernisation des moyens logistiques. L'étude montre qu'ils sont relativement assez performants dans six pays. Ils Y possèdent des réseaux de transmission de données par paquets ou réseaux de commutation de paquets (SENPAC au Sénégal créé en 1988, Nigerpac au Niger créé en 1989, Chadpac au Tchad, Rede Guine Telecom en Guinée-Bissau, Fasopac au Burkina Faso créé en 1990, Malipac au Mali créé en 1994). Dans ces six pays, il existe des stations terriennes avec des centres de transit. Ces réseaux de transmission de données par paquets sont reliés au NTI de Paris et au NTI de Lisbonne pour la Guinée-Bissau. Ils travaillent avec TRANSPAC (France) et TELEPAC (Portugal). Ils emploient les protocoles X25, X28. Ces structures de télécommunication offrent des services Minitel permettant une connexion aux bases et banques de données accessibles en mode vidéotex. La Sonatel (au Sénégal) vient de mettre en place un kiosque dans ce cadre.

L'Etude a permis d'observer qu'on a pas tendance à exploiter les réseaux de télécommunication dans la gestion des bases et banques de données agricoles.

Les Logiciels, les Systèmes d'Exploitation et les Outils Méthodologiques – *Les logiciels*: Deux logiciels sont généralement utilisés. Il s'agit d'abord de micro CDS/ISIS. Mis au point par l'UNESCO, il est distribué gratuitement dans le Sahel par le Centre régional de coordination RESADOC, la BIEF et quelques particuliers. La version 2.3 est assez répandue. La version réseau commence à être introduite. Le Logiciel CDS/ISIS couvre les 50 % des bases de données bibliographiques. Il vient en premier rang pour l'ensemble des bases et banques de données agricoles et il est suivi par DBASE (III,IV, III +) qui selon le journal "l'ordinateur africain" est le plus répandu en Afrique. Dans certains pays (Sénégal, Niger, Burkina Faso), on a mis en place des clubs d'utilisateurs de CDS/ISIS pour favoriser les échanges d'expériences .Le succès de micro CDS/ISIS et de DBASE s'explique selon le sondage effectué, par leur convivialité et par le fait qu'on les trouve suffisamment portables.

La deuxième raison est qu'ils sont utilisables par n'importe qui et que CDS-ISIS est gratuit.

En troisième rang vient TEXTO, mis au point par CHEMDATA et introduit dans la sous-région par la coopération française. Ce logiciel est utilisé par 20 % des bases de données agricoles.

Le Logiciel ORACLE commence a être apprécié (le CNDST au Sénégal l'utilise dans le cadre du RNIST) parce qu'il offre selon l'argument le plus répandu, l'avantage de pouvoir permettre de construire une base et son habillage sur micro qu'on peut rendre opérationnelle sur un système multiposte sans modification.

HYDROM et CLIMAT, logiciels développés par le Centre Agrhymet ont été choisis pour piloter les banques de données agrométéorologiques.

Le logiciel EMA dont la version 2 est éditée par la société IXEL sous licence ORSTOM est développé depuis 1989 par une équipe pluri-disciplinaire et est utilisé par le réseau des banques de données des prix des produits agricoles mis en place dans les neuf pays du Sahel par le projet DIAPER(Diagnostic Permanent II) du CILSS. Les autres logiciels qu'on trouve sont : Minisis (au Centre régional de coordination du RESADOC/Institut du Sahel), Lotus 1.2.3., 4ème dimension (au Mali), Filing assistant (dans les 4 collectifs d'ONG du réseau SIS-ONG : SPONG/Burkina Faso, CCA-ONG/Mali, GAP/Niger, CONGAD/Sénégal), Wordperfect 5.1., Rainman,IDA (Image Display Analysis), Agman, Omega, SPSS, Quatro TSP, Quatropro, Cardbox, Paradox 35, Edibase (CEFOD au Tchad), systat. Dans 70 % des cas, les logiciels sont acquis ici par don.

Le problème d'échange de données étant très lié à la compatibilité entre les logiciels, on a suivi ces dernières années, avec beaucoup d'attention au RESADOC, la mise au point par le service IST du CIRAD d'un programme d'interface entre CDS-ISIS et texto et les travaux effectués de par le monde entre DBASE et CDS-ISIS, entre Edibase utilisé par le centre Sahel de l'Université Laval (Canada) et CDS-ISIS et les possibilités d'importation et d'exportation de fichiers entre Minisis et CDS-ISIS.

On a remarqué que, dans la gestion des bases et banques, on emploie quelquefois des utilitaires comme NORTON et PCTOOLS et des systèmes tel que windows sous DOS. Mais ce n'est pas systématique. Nous soulignons la présence de ces outils parce qu'ils apportent une aide précieuse dans le compactage de fichiers, le transfert de micro à micro, les sauvegardes sur plusieurs disquettes autrement que par BACKUP, les récupérations de fichiers effacés ou abimés et surtout l'édition de produits.

Les systèmes d'exploitation, les outils méthodologiques: La quasi totalité des bases et banques de données agricoles identifiées tournent

avec le système d'exploitation MS-DOS. 0S2 et UNIX(exploité au CNDST pour le réseau RNIST du Sénégal) sont très rares.

Pour les bases de données il est reconnu la nécessité d'employer des outiles méthodologiques (bordereaux de saisie, manuels d'opération ou règles d'écriture et listes de descripteurs ou thésaurus. Ils jouent un rôle important dans les échanges.

On a remarqué que les méthodologies AGRIS et RESADOC ont fait autorité dans la gestion des bases et banques de données de la sous-région. Deux autres méthodologies, PADIS et BABINAT sont aussi quelque fois choisies. La recherche d'une compatibilité entre ces méthodologies est très avancée. Le Thesaurus Agrovoc et la liste d'autorité RESADOC sont souvent employés pour l'indexation dans 45 % de cas des bases agricoles. La majorité des institution ont créé leurs propres outils et très souvent on y travail avec une indexation libre. C'est là un facteur limitant pour le développement des échanges. Ce problème ne nous semble cependant pas insurmontable.

*Les Moyens Humains ou les Gestionnaires/Administrateurs des Bases et Banques de Donnée*s – Dans tous les cas étudiés, il y a au moins une personne formée, chargée de gérer la base ou la banque de données. Pour les bases ce sont surtout des spécialistes de l'Information (Documentalistes, bibliothécaires) qui sont soit formés sur le tas soit par des stages et séminaires techniques organisés par le RESADOC, le CTA, l'Ecole Internationale de Bordeaux de l'Acct, le Ministère Français de la coopération (Stages-IBISCUS) et la BIEF pour ne citer que ceux la.

On trouve ensuite des informaticiens (ingénieurs-systèmes, programmeurs, analystes), des statisticiens et des biométriciens chargés surtout des banques de données statistiques (banques de données agricoles, agro-météorologiques, et de prix agricoles sur les marchés). On a recensé en fin, un groupe moins

nombreux composé de : journaliste, juriste, Environnementaliste, Forestier, Hydraulicien, Historien, Vétérinaire, Technicien d'élevage, agroéconomiste, Agronome.

Le niveau de formation générale qui est assez correct, ne sera pas un handicap sérieux pour les perspectives de diffusion. En effet, les 3/4 des gestionnaires ont au moins le baccalauréat et les 50 % ont fait des études universitaires (entre le 1er et le 3ème cycles).

Le seul facteur limitant et qui n'est pas des moindres pour les perspectives de développement et de positionnement sur le marché mondial de l'information, est l'insuffisance d'une formation de base en informatique pour la majorité (Micro-informatique pure, programmation, analyse). En effet, les 95 % des administrateurs et gestionnaires n'ont pas bénéficié d'une formation en informatique pure et/ou d'une formation scientifique. Par conséquent, ils éprouvent d'énormes difficultés pour comprendre les logiciels et une bonne partie d'entre eux a besoin de formation plus poussée pour piloter efficacement des systèmes.

Pourtant, il ne manque pas de structures de formation en informatique dans la sous-région. On peut citer le CESAG à Dakar, les IUT et quelques instituts privés (Ex. Tata informatique, au Mali, IPG au Sénégal, l'ISS en Mauritanie, l'Ecole supérieure d'informatique et l'Université de Ouagadougou au Burkina faso.

Politiques Institutionnelles, Nationales et Régionales (Démarches et Approches) – Les démarches et les approches adoptées sont des indicateurs très importants dans cette étude. L'analyse permet de cerner ici les contexts (projets et autres) dans lesquels sont créés et gérées les bases et les banques de données agricoles

Nous avons fait les constats suivants:

• Même si quelques pays ont pensé tracer des cadres d'échanges sous forme de réseaux nationaux d'IST

et promulguer des textes (lois, décrets, arrêtés, circulaires et décisions) pour organiser un volet de l'IST, force est de constater qu'il n'existe dans aucun des pays une politique cohérente et globale de l'IST. Rares sont ceux qui ont des plans directeurs informatiques malgré que certains pays ont posé des jalons et mis en place des structures pour gérer la question informatique d'une manière générale et la question des bases et banques de données d'une manière spécifique.

• Les initiatives nationales commencent à être prises. On peut citer entre autre : *La création en 1987 au Sénégal d'une délégation à l'informatique,* en tant que département ministériel et démembrement d'un Ministère de la modernisation de l'Etat et les projets qu'elle a initiés : le projet Gatway conçu avec la Banque Mondiale lié au Technopole de Dakar et ambitionnant de créer un espace de communication, le RNIST (réseau national d'IST), le SITTDEC (bases de données commerciales, économiques et financières réparties sur des serveurs multiples mis en oeuvre dans le cadre des activités du "groupe des 15" ou G15), "le réseau national" appuyé par le projet RINAF initié par l'UNESCO; *La création en 1990 de la DELGI (Délégation générale à l'nformatique) au Burkina faso* chargée de l'application de la politique informatique de l'Etat définie par un conseil supérieur de l'informatique; *En 1990, nous avions défini dans le cadre du processus de dynamisation du RESADOC,* une stratégie de développement de bases et de banques de données nationales. Si le plan de redressement et de relance du CILSS n'avait pas gelé le projet, depuis 1992 un réseau interconnecté sahélien (RESANET) branché sur RIO et partant sur Internet aurait été opérationnelle.

C'est dans cette même dynamique que s'est inscrite la participa-

tion régulière de RESADOC à SE-SAME et un projet de production d'un CD/ROM Sahel avec le CI-RAD, le centre Sahel de l'Université (Laval) et le club du Sahel/OCDE. Ce CD/ROM devait comprendre 80.000 références bibliographiques résultant d'une compilation des bases des différents partenaires et du produit du télédéchargement de grandes bases internationales (cf.tableau en annexe), un catalogue collectif comprenant 10.320 titres de périodiques. Ce CD/ROM doit renfermer aussi: une base de connaissance ou données factuelles sur le Sahel touchant essentiellement : la géographie physique, la climatologie, l'ethnologie, la démographie, les écosystèmes et les peuplements végétaux et des données statistiques sur les recherches agricoles en cours récupérées auprès du SPAAR, de l'USAID, de la FAO et de l'OMS.

D'autres projets intéressants seront cités au *Initiative et Coopération avec la Communauté International*.

Après avoir fait ces constats, essayons de cerner quelques informations recueillies par les enquêtes sur les démarches et approches utilisées.

L'enquête révèle que: Les 80 % des bases et banques de données n'ont pas fait l'objet d'une étude de faisabilité et l'élaboration de cahiers de charge n'a pas été systématique pour l'acquisition du matériel pour la gestion. Il n'est donc pas étonnant que des problèmes de tous ordres surgissent;

Sauf quelque exceptions (trois cas identifiés), les institutions n'ont pas pensé à sécuriser les bases et les banques en souscrivant à des polices d'assurance;

La maintenance se fait, mais le plus souvent en cas de panne. 15 % des postes de travail seulement font l'objet d'une maintenance préventive. Dans ce lot, les 3/4 se font par un technicien-maison et le reste par une société informatique à partir d'un contrat trimestriel, semestriel ou annuel préétabli. Pourtant les conditions climatiques et atmosphé-

riques (dont les caractéristiques principales sont la chaleur et l'abondance de poussière) et la présence de beaucoup de sociétés privées spécialisées en maintenance (Ex. Tata informatique au Mali, RTI au Sénégal) militent en faveur d'une systématisation d'une maintenance préventive régulière. Le manque de moyens financiers et quelquefois l'absence dans le pays de structures aptes à faire cette maintenance expliquent cette situation.

Domaines Couverts – Les quatre sous-secteurs de l'agriculture sont représentés de la manière suivante : production végétale (Agronomie) 40 %, Elevage : 20 %, Foresterie : 15 %, Pêche : 10 % et domaines connexes (hydraulique, Environnement, Alimentation, commerce et industrie agro-alimentaires) 15 %. Les domaines les plus significatifs couverts par les bases et banques de données sont : Recherche agronomique, hydrologie, législation agricole, production animale, production halieutique, population agricole, environnement, agroforesterie, foresterie, équipement rural, aménagement des terroirs, planification agricole, barrage hydro-agricole, irrigation agricole, protection des végétaux, élevage et médecine vétérinaire, ressources naturelles, télédétection, technologie agricole vulgarisation agricole, socio-économie agricole, sécurité alimentaire, céréales.

Quelques caractéristiques importantes méritent aussi d'être citées. On trouve en effet des bases et banques de données avec: des statistiques, textes législatifs, dépouillement de périodiques, cartes de productions herbacées et ligneux, des SIG (systèmes d'information géographique), tableaux de bord, ISDS ou publications en série, élevage de chevaux de course, cartes d'identité de pays, fiches de projets agricoles, fiches d'ONG agricoles, Fiches de technologies agro-alimentaires, thèses et mémoires, programmes et projets de recherche en cours, chercheurs, institutions de formation agri-

cole, système d'alerte précoce, données pluviométriques depuis 1930.

Cette exhaustivité des domaines couverts montre déjà la richesse des bases et banques existantes et la possibilité de sortir du cadre classique qui limite le domaine agricole à quatre sous-secteurs et de favoriser une spécialisation plus accrue.

L'étude des besoins des utilisateurs des bases et banques de données indique la nécessité d'en créer prioritairement, dans les domaines suivants : recherche agronomique, ressources naturelles, socio-économie, agroforesterie, agrométéorologie, élevage et médecine vétérinaire, pêche, environnement, législation agricole, formation agricole, vulgarisation agricole, système de production et technologie agraire, projets agricoles, désertification, hydraulique, sécurité alimentaire, échanges commerciaux, agro-pastoralisme.

Diffusion-valorisation – La diffusion et la valorisation des informations sont en principe les objectifs recherchés quand on crée une base ou une banque de données. Ce sont des éléments importants pour mesurer l'efficacité de ces instruments de travail. On pense de plus en plus que la fonction de diffusion est étroitement liée aux actions de marketing.

L'enquête aussi bien auprès des gestionnaires que des utilisateurs des bases et banques de données agricoles a revélé que çà et là quelques initiatives, quoiqu'encore timides, de marketing sont menées. On a remarqué notamment les actions suivantes : diffusion de plaquettes et dépliants, insertions publicitaires dans des revues, présentation lors de journées portes ouvertes, conférences, séminaires, expositions, démonstration dans des foires-expositions, information-sensibilisation à travers des émissions radiophoniques, diffusion de lettres circulaires et d'affiches.

L'accès aux bases et banques se fait ici essentiellement par interrogation directe ou à travers une diffu-

sion de données en participant à un CD-ROM produit par des partenaires au développemet (Ex. SESAME qui contient des données du RESADOC et de l'ISRA Sénégal). Cette diffuion par CD/ROM n'est pas encore répandue. Il n'y a pas encore un seul CD/ROM produit spécialement sur une base ou une banque de la sous-région. L'accès par centre serveur n'est pas aussi répandu.

La diffusion se fait quelque fois par une décentralisation et un échange de fichiers sur disquettes à travers des réseaux documentaires (RESADOC, PADIS, Recit et SITTDEG (du G15), Agris, OMRS, info-doc SALVA, RESAGRIS, CARIS, IBISCUS, SIS-ONG, SIS-SPAAR, REDAB, réseau CIDES, Réseau de documentation Francophone, réseau de la BIEF, CCD-R3S) et des réseaux d'échange de données (Réseau OMM/Organisation Météorologique Mondiale, Réseau d'éducation environnementale de la croix rouge danoise, ISONET, RIO de l'ORSTOM, Internet, CGnet (du CGIAR), RINAF, FIDONET (USAID) et quelque fois à travers des systèmes spéciaux (SAP ou système d'alerte précoce, SIG ou système d'information géographique, SIM ou Système d'information des marchés).

L'appréciation de la diffusion a donné les résultats suivants : très bonne : 5 %, bonne : 30 %, assez bonne : 50 %, pas bonne du tout : 15 %. Ce qui veut dire qu'on pourrait mieux faire.

Les statistiques d'utilisation les plus récentes montrent que sur une population de 15.000 utilisateurs potentiels locaux, l'ensemble des bases et banques enrégistrent une utilisation moyenne de 412 interrogations par mois soit 4944 interrogations par an. On a même pas pu encore atteindre 1 interrogation par an par utilisateur. Il y a donc, un effort à faire pour mieux attirer la clientèle potentielle, parce que l'offre est de loin supérieure à la demande (3 fois plus). Pourtant cette offre ne satisfait pas la moitié des besoins ex-

primés. (cf *Domaines Couverts*).

Il faut nuancer un peu cette conclusion quand on sait que les contenues des bases et des banques sont diffusés aussi à travers des produits qui atteignent un public (ou utilisateurs) plus large. Parmi ces produits élaborés à partir des informations tirées des bases et des banques nous avons noté des : annuaires climatologiques, Data Sheet, bulletins d'informations météorologiques, bulletins agrométéorologiques, fews bulletins, rapports, cartes, tableaux statistiques, bulletins SAP, annuaires d'ONG, bulletins bibliographiques, index, catalogues, DSI, bilans céréaliers, listes de mémoires, répertoires de technologies appropriées, bibliographies analytiques.

Il y a également les communiqués de radios et télévisions des systèmes d'information sur les prix des produits agricoles et des institutions météorologiques nationales.

La population des utilisateurs est composée surtout de: chercheurs, décideurs, enseignants, étudiants et élèves, planificateurs, techniciens du développement, opérateurs économiques, bailleurs de fonds et partenaires au développement, spécialistes de l'information et de la communication, agents de bureaux d'études et consultants.

Problèmes et Contraintes – Les principaux problèmes et contraintes rencontrés sont d'ordre financier pour le renouvellement, la protection, l'assurance, la maintenance et le développement des moyens logistiques, la minimisation des risques liés aux virus, à la bombe logique et au piratage. Ensuite, viennent des problèmes de formation pour pour une maîtrise des logiciels et des nouvelles technologies de pointe, de compatibilité pour les échanges, de collecte de données suffisantes et quelque fois fiables, de maîtrise des besoins des utilisateurs, d'obsolescence, d'homogénéisation, de convivialité dans le cadre d'un échange à travers des réseaux et de diffusion.

Dans les perspectives de certaines

institutions, des solutions sont déjà préconisées pour lever les contraintes par la recherche de moyens, l'optimisation des investissements, la mise en place de dispositifs de recyclage et de formation permanente, l'instalation de réseaux locaux, la mise sur centres-serveurs des bases et banques de données.

Initiatives et Coopération avec la Communauté Internationale – Quelques initiatives intéressantes et porteurs tendant à créer un courant de coopération avec la communauté internationale et partant une démarche plus concertée dans la création et la valorisation des bases et des banques de données méritent d'être soulignées dans cette étude, comme potentiel à considérer positivement.

Le système régionale des banques de données du centre Agrhymet (Cilss): IL rassemble des informations sur la météorologie, l'hydrologie, la protection des végétaux, les ressources pastorales, l'agronomie et des références spatiales. Le système d'information géographique (SIG) de ce même centre permet une restitution cartographique de données sous-jacentes, avec possibilité de mise à disposition d'informations sur la biomase par unité administrative, la cartographie des rendements attendus pour les cultures vivrières, la localisation des mares ainsi que l'évaluation de leur niveau de remplissage et le déficit céréalier par entité administrative. Pour véhiculer ces informations, Agrhymet s'emploie à mettre en place un réseau de transmission de données utilisant les Satellites d'INMARSAT, avec équipement de chaque pays du Sahel d'une antenne parabolique.

Le programme diagnostic Permanent (Diaper) du Cilss: Il est basé sur un système de collecte, de stockage sur banques de données et de diffusion à travers les pays du Sahel de statistiques sur les céréales, l'élevage et sur d'autres domaines agricoles.

L'AID Famine Early Warming Sy-

stem: Il est financé par l'USAID/ Fews project. Il publie dans le Fews bulletin une analyse de données provenant de plusieurs banques de quelques pays du Sahel (Mali, Mauritanie, Burkina Faso, Niger, Tchad). Ces données ont trait à : la population et l'agriculture, la météorologie, les cours d'eau, au système d'information des prix des marchés agricoles, aux données satellitaires (indices de végétation sur les surperficies, les rendements des cultures obtenus par liaison télématique auprès de la NASA).

Le réseau d'information sur les ressources du sol et de la terre (STRING): Ce projet de l'Observatoire du Sahara et du Sahel (OSS) a démarré en 1992 et a pour objectif de renforcer la communication entre les hommes politiques, les cadres responsables du développement et les scientifiques. Il met en place et diffuse dans les pays du Sahel et ailleurs trois bases de données: Une base cartographique, une base bibliographique et une base institutionnelle. Le pilotage du projet se fait à partir de l'ISRIC (International Soil Reference and information center, Wageningen, Pays-bas).

Le plan d'action INSAH-SPAAR: Dans ce plan, un système d'information (SIS-SPAAR) sur les projets et programmes de recherche agronomique en cours est à construire. Le système met en place un mécanisme de collecte d'INPUT auprès des SNRA nationales, de l'Institut du Sahel et de diffusion d'une banque de données essentiellement destinées aux bailleurs de fonds. Le maître d'oeuvre est la Banque Mondiale.

Les réseaux de "recherche-éducation" en Afrique: Ces réseaux relient des établissements Universitaires, des centres de recherche, des organisations non-gouvernementales. Les plus significatifs dans la sous-région sont :

RIO: réseau TCP/IP et UUCP mis en place par l'ORSTOM, il est devenu un "Réseau intertropical d'ordinateurs". Il comprend actuellement 27 sites dont 16 dans 4 pays du Sahel (Sénégal, Mali, Burkina

Faso, Niger). Il offre un service de courrier avec possibilité d'accès aux documents, un forum électronique, un annuaire des utilisateurs et un service télétel;

Greennet: est une ONG membre de l'alliance for global communication. Elle permet de diffuser et de communiquer électroniquement. L'environnement fait partie de ses domaines couverts . C'est un réseau FIDONET. Certains de ses 280 correspondants, sont localisés en Gambie et au Sénégal;

REFER: est le réseau électronique francophone pour l'éducation et la recherche créé et piloté par l'AUPEF-UREF. Il s'appuie sur des points et centres SYFED. 170 points Syfed dans 12 pays et autour de 10 centres serveurs régionaux (dont un au Sénégal) permettent la consultation de 50 bases et banques de données en langue française et un échange d'information par la messagerie. REFER possède un centre de reroutage qui ouvre l'accès à des serveurs et aux autoroutes de l'information à travers Internet. Le service IST du CIRAD développe sur le même sillage un projet de "sous-système", le REFER-AV qui est une approche sectorielle agronomique et vétérinaire de ce réseau.

d'autres réseaux: non moins importants peuvent être signalés. Il s'agit de *Padisnet* qui couvre 34 pays, *Arsonet* dont fait partie le Sénégal, *Wednet* dont sont parties prenantes le Sénégal et le Burkina Faso, *Ngonet* auquel participe le Sénégal.

Le Projet RINAF: (Réseau d'échange d'information entre institutions en Afrique). C'est un projet de réseaux informatiques interconnectés en Afrique initié par l'UNESCO et mené par le CNUCE à Pise (Italie). Le projet qui a demarré en 1991 est déjà entrain de se construire. Une partie du matériel commence à être installé. La réunion de lancement a eu lieu en février 1992 au Sénégal. L'ambition du Projet RINAF c'est d'appuyer un développement d'entités nationales ou réseaux nationaux, les aider à se connecter

sur le plan régional et à s'ouvrir au trafic mondial de données.

Notons ici l'existence d'un projet complémentaire au projet RINAF dénommé *RASCOM*. C'est un projet inter-africain de réseau continental qui repose sur des liaisons par Satellite géostationnaire.

Les observatoires et les réseaux électroniques n'en sont en Afrique et au Sahel qu'à leurs premiers pas. On leur prédit un essor considérable dans les années à venir. En effet, le courrier électronique intéresse déjà le monde de la recherche et ses performances excitent les appétits des multinationales et des grandes opérateurs économiques. Autrement dit, il ne laisse donc pas indifférents les marchands d'informatique. Il nous semble donc nécessaire d'organiser et de suivre l'évolution de cette nouvelle technologie pour en tirer un avantage certain.

Conclusions et Recommandations

Les conclusions que nous retenons et les recommandations s'inscrivent dans la logique de définition d'une stratégie pour un développement intégré et durable de la sous-région.

Conclusions – La première conclusion à tirer de cette étude est qu'il y a des acquis d'un point de vue quantitatif et qualitatif. En effet, 181 bases et banques de données agricoles opérationnelles existent dans la sous-région et la majorité offre une information pertinente parce que indispensable pour le développement de l'agriculture.

Il faut cependant reconnaître que par rapport à la demande potentielle cette offre est très minime. Les moyens logistiques, financiers et humains existants sont insuffisants et quelque fois ne sont pas bien optimisés. Plusieurs domaines qui devaient être prioritaires ne sont pas couverts. Les actions de diffusion et de valorisation ne sont pas assez agressives. Il y a beaucoup de problèmes liés surtout à la maintenance,

à la sécurisation des données et aux échanges, le transfert de l'information ne s'accompagne pas souvent d'un cadre contractuel prévoyant la possibilité de compter sur un flux de connaissances à venir.

Quelques initiatives porteurs ont été prises. Certaines sont en cours d'opérationnalisation tant sur le plan nationale, régionale, qu'africain. On pourrait sur ce chapitre souligner essentiellement les jalons posés pour la production de CD-ROM et par la mise en place de projets, de programmes et de réseaux informatiques de bases et de banques de données agricoles dans la sous-région.

Force est en outre de souligner l'absence aussi bien sur le plan national que sous-régional de politiques globales et cohérentes sur l'information scientifique et technique de manière générale et de bases et banques de données agricoles de façon sectorielle. En l'espèce, il n'y a pas de cadre catalytique pouvant et de mécanismes de régulation pour permettre une concertation régulière, une démarche fédératrice, une organisation et un fonctionnement intégré et valorisant.

Recommandations – Il est avant tout nécessaire, de créer un cadre de concertation, pour ensuite, à partir de l'analyse statique de la situation que nous venons de faire, dégager une stratégie dynamique à court terme, pour emmener les Etats, la sous-région et les partenaires au développement à définir et à adhérer à une *charte commune,* en attendant dans le moyen terme, de passer à l'élaboration de politiques régionales et nationales articulées d'information scientifique et technique.

Pour se faire, deux actions nous semblent pour le moment prioritaires : la répertorisation systématique des bases et des banques de données, des structures de formation , des maisons de maintenance et des vendeurs de matériel informatique au Sahel et la tenue d'un atelier pour analyser, valider et enrichir la présente étude, dégager des pistes de réflexion complémentaires et préparer la tenue d'une conférence au cours de laquelle seront organisés plusieurs forums thématiques.

Ces deux rencontres pourraient regrouper des spécialites de l'information, des utilisateurs, des informaticiens. Pour la conférence, en plus, des décideurs, des partenaires au développement, des bailleurs de fonds et des opérateurs de télécommunication devraient y prendre part.

Certaines institutions pourraient prendre en charge cette recommandation. Parmi elles : le Cilss, le club du Sahel, la CEDEAO, des partenaires au développement comme le CTA, le CRDI, l'ACCT, la Banque Mondiale et de grands opérateurs économiques.

Une attention particulière devra lors de la définition de la stratégie concertée être apportée, si on se place dans une logique et dans une perspective de développement intégré et autocentré du Sahel et de l'Afrique de l'Ouest à :

• La définition du rôle, des objectifs et des domaines prioriaires des bases et banques de données qu'on peut percevoir comme moyens de stockage, de diffusion et d'échange d'information devant aider à : l'élaboration de politiques, la prise de décision, la planification, le suvi-évaluation, la recherche, la formation, la vulgarisation, le développement à la base;

• Un maillage physique des partenaires dans un système d'information agricole intégré Ouest africain ouvert aux partenaires et apte à : traduire les jalons posés et initiatives déjà prises en acquis, mettre en place un mécanisme pour harmoniser et uniformiser les méthodes, produire des outils et standards communs pour favoriser les échanges, articuler les réseaux, éviter les duplications et optimiser les moyens;

• aux voies et moyens pour le développement des réseaux de télécommunication, de la diffusion, du marketing, de la valorisation des informations, de la formation et du perfectionnement d'une expertise et des utilisateurs des bases et banques de données.

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Annex 1 – Répartition statistiques des bases et banques de donnée agricoles au Sahel

Pays	Bases de Données	Banques de Données	Total Bases et Banques	CD/ROM	Total Bases, Banques, CD-ROM
Burkina-Faso	9	5	14	8	22
Cap-Vert	3	2	5	3	8
Gambie	6	2	8	2	10
Guinée-Bissau	4	2	6	2	8
Mali	29	25	54	16	70
Mauritanie	8	4	11	2	13
Niger	13	3	16	17	33
Sénégal	30	26	56	15	71
Tchad	7	4	11	8	19
Total Général	109	72	181	73	254

BASE	Burki	Capve	Gambi	Guibi	Mali	Mauri	Niger	Seneg	Tchad	*Total*
AGRICOLA	468	109	264	29	325	102	296	942	262	*2797*
AGRIS	662	186	202	59	659	260	597	1603	288	*4516*
CAB	1242	141	667	100	995	266	800	2328	440	*6979*
PASCAL	477	406	241	69	602	278	606	1297	192	*4168*
GEOBASE	175	60	64	21	236	80	367	377	90	*1470*
GEOREF	211	578	59	35	417	634	910	842	509	*4195*
MEDLINE	358	30	514	191	381	85	220	1584	253	*3616*
DELPHES	307	43	52	64	320	292	611	907	205	*2801*
URBAMET	279	8	21	22	297	209	258	508	191	*1793*
FRANCIS	968	63	109	90	1327	440	1173	1821	665	*6656*
IBISCUS	1702	228	182	198	1419	663	1772	2464	641	*9269*
HORIZON	977	39	49	7	383	102	715	1621	682	*4575*
CIDARC	1020	47	75	49	1007	176	591	1604	667	*5236*
Total	*8846*	*1938*	*2499*	*934*	*8368*	*3587*	*8916*	*17898*	*5085*	*58071*

Total global: 58071

AGRICOLA	461
AGRIS	764
CAB	1081
GEOBASE	362
GEOREF	366
PASCAL	521
MEDLINE	83
DELPHES	61
URBAMET	64
FRANCIS	609
IBISCUS	597
HORIZON	206
CIDARC	682

Total global: 5857

Les chiffres indiqués correspondent aux nombres de références bibliographiques avant élimination des doubles.

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MR. SAMBA AW is an organizational and information consultant. He is the former coordinator of RESADOC.

CONTACT ADDRESS:

Samba Aw
Villa 6070 SICAP Liberte 6
B.P. 10402
Dakar Liberte, Dakar
SENEGAL
Phone: +221-27-35-21
FAX: +221-25-55-69

Planning for a Sustainable Information System in the Electronic Age: Tradition Versus Technology

Margot Bellamy

ABSTRACT: This paper draws on the literature and on the experience of CAB International and others of assessing needs and advising on appropriate systems in a wide range of developing countries, to provide a draft plan for a sustainable agricultural information system for a hypothetical country whose circumstances match those found in many Anglophone African countries, but which may be more widely applicable. It defines the aims of the system, first in terms of national needs (functions, users and constraints), and the state of development of national information technology (IT) policies and systems, and then in the wider regional and network context. It develops a five-year scenario which allows for changes in both needs and technology, but which incorporates essential elements of the original structure and resources, the ultimate goal being a system which is demand-driven, not technology-led. The discussion encompasses such issues as: the role and function of the library in the IT age; outreach vs. storage and preservation; the changing role of the information intermediary in meeting client needs and adapting to new technology; which elements of the new technology are needed to fulfil the identified functions; new communication channels; compatibility within and between countries; and cost-effectiveness.

RESUMÉ: Cet article se base sur la littérature existante et l'expérience de plusieurs institutions dont le CAB International, qui ont réalisé des évaluations de besoins, et donné des conseil sur des systèmes appropriés à de nombreux pays en développement. Il propose un plan pour un système d'information agricole durable destiné à un pays hypothétique, dont les circonstances correspondent à celles de beaucoup de pays anglophones africains, mais qui pourrait être appliqué plus largement à d'autres pays. Il définit les objectifs de ce système, d'abord en termes de besoins nationaux (fonctions, utilisateurs et contraintes), et le stade de développement de la politique et des systèmes de technologie d'information nationale, avant de le placer dans un contexte régional et mondial grâce aux réseaux électroniques. Il développe un scénario étalé sur 5 ans, ouvert à des changements au niveau des besoins et de la technologie, mais qui incorpore des éléments essentiels des ressources et de la structure originales. Le but final est d'avoir un système basé sur la demande et non pas sur la technologie. L'analyse inclut les points suivants : le rôle et la fonction de la bibliothèque dans l'ère des technologies de l'information, la portée de l'information par opposition à l'archivage et la conservation, le rôle changeant de l'intermédiaire dans la satisfaction des besoins du client et l'adaptation à de nouvelles technologies, les éléments de la nouvelle technologie nécessaires aux fonctions identifiées, les nouvelles voies de communication, la compatibilité au niveau national et international, et le rapport qualité-prix.

RESUMEN: Se presenta el bosquejo de un plan para un sistema de información agrícola que sea sostenible para un país hipotético, cuyas circunstancias se asemejan a las de muchos países africanos angloparlantes pero que pueden aplicarse de manera más amplia. Para diseñar el plan, se basó en la literatura y la experiencia que tienen el CAB International y otras instituciones en la evaluación de necesidades de información y en la prestación de asesoría sobre sistemas apropiados en un amplio rango de países en desarrollo. Los objetivos del sistema se definen, primero en términos de las necesidades nacionales (funciones, usuarios y limitaciones) y el estado de desarrollo de la política y el sistema de tecnología de información (TI) a nivel nacional, y luego en un contexto más amplio a nivel regional y de la red. El plan desarrolla un escenario de cinco años que permite cambios tanto en las necesidades de información como en la tecnología, pero que incorpora elementos esenciales de la estructura y los recursos originales. La meta final es un sistema guiado por la demanda y no por la tecnología. La discusión abarca aspectos como: el papel y la función de la biblioteca en la era de la TI; la difusión de la información versus su almacenamiento y conservación; el papel cambiante del intermediario de la información en la satisfacción de las necesidades de los clientes y en la adaptación de nuevas tecnologías; la determinación de aquellos elementos de las nuevas tecnologías que se requieren para cumplir con las funciones identificadas; los nuevos canales de comunicación; la compatibilidad dentro de los países y entre ellos; y la efectividad en función de los costos.

A<small>N AUDIENCE OF</small> information specialists needs no convincing of the value of information, nor of the need to devote adequate resources to its provision. However, the electronic age brings with it a new set of dilemmas in terms of choosing between, or the best combinations of, alternative methods of information transfer, and deciding on the best 'package' to meet all the various needs identified for a national or regional system.

A greater commitment of politicians and policy makers to the im-

portance of a strong information base to support national and regional agricultural research systems is evident from the deliberations of many meetings and seminars in recent years (ISNAR, 1993; CTA, 1994). However, it falls to the information managers and their staff to translate this commitment into reality in the form of a system that works, that is sustainable, and which answers needs.

The system(s) adopted depend on a wide range of criteria: the wishes of the decision makers themselves; the structure and state of evolution of the research system; the state of the existing information and telecommunication infrastructure; the resource base; the range of services required; the size of the constituency—-national and regional. It also depends on the vision, knowledge and perception of the information professional.

This paper does not seek to provide the perfect plan. Its aim is to draw on recent experience of assisting in the planning process, or of observing it at work, principally in CABI member countries in Africa, and on some pointers from the experience of others and the literature, to comment on what might be appropriate scenarios for the future in some of the typical situations encountered in that continent.

This last decade of the 20th century could witness the 'information revolution' finally taking place in Africa, as new alliances are formed, new communication technology becomes a way of life, and more liberal political regimes permit real freedom of information transfer through a wide range of media. Imagine the hypothetical luxury of a million dollar a year budget for your information system, and the challenge of having it up and running and sustainable by the year 2000. With boldness, vision and good management, this is not out of reach if some of the promised investment materializes, and if international collaboration within the continent really takes off.

The Past and the *Status Quo*

The information scene in some parts of Africa has undergone many ups and downs in the past 30 years—from viable national systems in the 1960s and 1970s, with good libraries and collections, and working regional networks, down to destruction by war, breakdown of political and economic alliances, neglect and lack of funding in the face of other priorities, lack of commitment at the top, and lack of influence in the information community to make things change, and up again as some national research systems began to put information on the policy and funding agenda, the International Centres in the region provided example and encouragement, with outside organizations such as The Technical Centre for Agricultural and Rural Co-operation (CTA) acting as catalysts. Now, in the mid-1990s, there are real signs of dynamic change: countries and regions have identified their needs, the research and information communities are realizing the benefits of synergism and coming together to decide on the future.

Some encouraging examples exist of new systems already working: Ghana has an impressive new agricultural information network; with assistance from CTA, the regions have carried out national and regional assessments of needs, and many of us from outside and within the continent have been involved in advising on appropriate ways of developing and managing information projects and programmes. CABI's own experience includes working with both Ghana and Tanzania at the planning stage, and helping to implement the Ghana NARP; working with local teams to survey the information needs of Malawi, Zambia and Uganda as part of its own country survey programme; working with KARI on its strategy as the national focal point of agricultural information in Kenya; taking part in many seminars and workshops seeking solutions to problems of informa-

tion provision and management; and training information professionals, both *in situ* and at CABI.

None of this experience gives any of us from the outside the right to make decisions or impose systems. I believe that while some resources may be needed from outside, the decisions have to be made, and successes and failures sustained, by the national and regional systems themselves. We can and should share our skills, experience and ideas; all of us are grappling with the rapid march of progress, and have to take similar decisions to our colleagues in less well-endowed institutions in Africa. We can also get out of date very quickly, which is why any scenario for more than five years ahead has elements of crystal ball gazing in it!

I was made sharply aware of this when I rediscovered a paper given to a CGIAR meeting in the Hague just five years ago, in which I tried to develop an illustrative short, medium and long term scenario for how we might assist an African country setting out to rebuild its information system from a very low point. At that stage we were all still mostly wedded to the concept of the library with books and journals on the shelves, CD-ROM was just taking off in Africa, full-text and multi-media CD-ROMs were still on the drawing board, and none of us had taken even tentative steps along the superhighway. Even quite recent consultants' reports, especially if you trace them back over a five-year period for the same country, illustrate how rapid the changes affecting decisions about information systems have been, and how difficult it is to decide among the options. Just consider how much has happened in the information industry in those five years, and where we might be in five years' time. How do we make the right choices and arrive at the right balance?

Brainstorming the Future

If we were to engage in the fashionable game of 'brainstorming' about our future ideal information

system, what adjectives would we apply? We might choose such words as "flexible", "imaginative", "realistic", "sustainable", "responsive to change", "cost-effective", "demand-driven", "self-financing", "technology-driven". These could apply in almost any planning exercise. We might then come down to earth a bit, and think about the real world—what would we need to make it work? Concepts like 'commitment', 'funds/budget', 'people', 'institutions', 'equipment', 'technology', 'collaboration', 'services', 'users', 'networks', 'regional focus', and 'international perspective' then come into play.

Our ideal system undoubtedly needs to take account of all of these; it also needs to examine where it is coming from, where it hopes to go, the constraints it is likely to have to operate under, and the pace at which change can be implemented. A description of a hypothetical situation—Country X—cannibalized from many experiences, may help to illustrate the choices and give us clues as to how to spend that mythical million dollars.

Existing Scenario in Country X

Imagine a country with agriculture as the mainstay of its economy and major export earner. Its inherited research system is run down due to lack of resources. The physical infrastructure (buildings, and so forth) visibly needs refurbishment and modernization. Skilled manpower is scarce throughout the system. Scientists lack motivation, partly because of the extreme difficulty of deciding between priorities when resources are very scarce. This may then result in lack of access to information to support their research. There are few information specialists; those in post lack motivation because their working constraints prevent them from delivering any services, and there are better working conditions in other institutions. There is little or no contact with other institutions in the region, and virtually no use is made of international systems.

Five years ago, the prevailing opinion in the country and consultants' advice would probably have concentrated resources on renovating or creating new physical infrastructure (buildings and furniture), providing back runs of serials, ensuring the main secondary sources were in place, the purchase or donation of books, and (probably) provision of a computer. Most of the resources would have gone into one central information centre, which would probably also have been designated as an AGRIS input centre, but intermittent staffing may have had a detrimental effect on delivery. There would have been little or no collaboration between information centres within the country, and poor knowledge of what was available in each. No systematic efforts to capture national or local data or indigenous knowledge were in evidence. On-line access was never an option because of poor telecommunications, and little use was being made of "free" services, such as those from International Livestock Center for Africa (ILCA), CTA, INFOTERRA. The major agricultural databases were just becoming available on CD-ROM, so probably a CD-ROM drive and discs might have been included in consultants' recommendations and any resulting project. Training of staff, mainly through prolonged absence overseas, was also a priority. This 'shopping list' could easily have gobbled up the million dollars, without any thought for the longer term, or, more importantly, for what users really wanted, or what services were needed. Remoteness in all senses of the word was the hallmark of the system and the people trying to work within it.

Such a short-term view and this kind of scenario has, of necessity and because of greater awareness of needs, and the potential offered by developments in technology, become increasingly dissipated in re-

cent years, and Country X might regret its choices if it had gone too far along the traditional road. Luckily, in the interim, the successful introduction of CD-ROM technology, distributed by organizations like CTA, or through funding from enlightened donors, has made the breakthrough from the traditional to the modern approach, as well as giving a bit of breathing space for reconsideration of the options.

What lies Ahead?

Developments in the information scene worldwide, and within Africa itself, have changed the perspective and the options considerably, although inevitably there are still pockets of resistance to change. The changes outside will obviously have a profound effect on what happens in Africa, but even more critical will be how the current upsurge of (at least verbal) support for information in the wider agricultural and political community is translated into action and, more importantly, absolute commitment of resources, to developing and sustaining appropriate systems and services. The information component of the Ghana NARP is one of the most generously funded anywhere on the continent, and the programme has been able to incorporate many of the best elements of the traditional and the modern, including completion of the central information centre, introduction of CD-ROMs all over the country, training in-country and outside, sensitizing of the research community, compilation of a national archival database, and rationalization of and cooperation in the use of library collections throughout the country. The questions which need to be asked now are: what next? will it be sustainable? who pays?

The plethora of valuable country needs studies and regional reports and initiatives carried out with CTA support all over the continent in the past two years, (such as Bunyob and Ngwiru, 1994; Wangati and Ng Kee Kwong, 1993), and the reports of

workshops sponsored by CTA, Special Program for African Agricultural Research (SPAAR), International Service for National Agricultural Research (ISNAR) and others, as well as our own observations, provide many pointers and encouraging signs for future activity, not least of which are the continuity and wealth of experience of personnel in many of the national and regional information centres, and the capacity of many of them to assist the less well-endowed.

I have no doubt that the capacity, resources and will, exist already or could be made available within Africa to meet many of the requirements of modern but appropriate systems at national and regional levels. CD-ROM technology and skill in its use is an accepted and valued component of the information and research scene. A logical further stage, well beyond the drawing board in some places, is to develop the capacity to put national databases on CD-ROM, and network, under appropriate licensing arrangements, these and other databases around the country or region. CD-ROM technology itself has advanced beyond the purely bibliographic to the fulltext and multimedia versions, and into the Electronic Reference Library (ERL), thus making available more and more non-traditional options for information transfer, to a much wider range of users, without the need for more buildings.

Collaboration Holds the Key

Sharing of resources, technology and expertise needs to cross the boundaries between agriculture and other sectors and disciplines to realize the full potential for collaboration. Full use of the information superhighway—the Internet—depends on the capacity of the national communication network to carry and transmit it. Commitment of funds on a national level to make this possible, or integration into a regional

or neighbouring country system, may depend on pooling of funds from many sources, or lobbying of the appropriate Ministry to get things moving. Tanzania seems to be moving on this, and some southern African countries are able to get access through South Africa.

Training is another area where collaboration on a regional or interdisciplinary basis makes sense. High level facilities for information training may be considered by some to be relatively scarce in Anglophone Africa, but there is much greater scope for collaboration, between institutions, within regions and across disciplines, with input and assistance from outside agencies where necessary. The joint training courses run by ILCA/International Centre for Research in Agroforestry (IC-RAF), the facilities available in Ethiopia, Botswana, and South Africa, the expertise of Eastern and Southern African Management Institute (ESAMI), Pan-African Development Information System (PADIS) and others, could all be harnessed more effectively than at present, and they are more likely than institutions outside Africa to be able to gauge and meet needs with appropriate courses and materials (Musana, 1994).

The Forces for Change

Another aspect of the 'traditional versus modern' dilemma is the difficult decisions which may have to be made about how far to take conservation and preservation of valuable and possibly unique archival library resources, and how to balance this against more urgent needs for current information and new technology. Kenya faces this particular problem, as it seeks to develop the 'right' system to support current research around the country through the National Focal Point, but to conserve and preserve the unique East African collections at Muguga, which are themselves the result of past regional and international collaboration, as anyone who remem-

bers the East African Literature Service will testify. A compromise is needed which satisfies the demands of the old and the new and makes the best use of the resources available.

All the signs are that the emphasis generally has already shifted in favour of the new, but with some unique African features and special needs. In a continent where the oral tradition is especially strong, ways need to be found to collect and disseminate indigenous knowledge. More needs to be done to pool valuable information across language barriers, especially to bridge the Francophone - Anglophone - Lusophone gap; the technology is rapidly becoming available to make this possible, for example through interfaces and guide screens on CD-ROMS, and through multi-lingual thesauri.

Political change, too, is playing its part; democratization brings with it a more liberal view of information dissemination. It also enables, as we are already witnessing in Eastern and Southern Africa, much closer collaboration and sharing of resources, a trend which will accelerate with the full entry of South Africa into the activities of the region (Fouché, 1994).

Conclusion

The overriding trend is toward a less rigid approach, less emphasis on infrastructure (except telecommunications) and more on wise use and allocation of resources, full exploitation of the possibilities offered by new technology, more emphasis on users and services, and on selection, retention and training of information personnel, and, above all, more cooperation and collaboration, nationally, regionally and internationally. Many of us in the international community (not least CABI) are increasingly taking our activity closer to the action and will have a much stronger regional approach in our programmes. We shall also be in a better position to benefit from

local knowledge and expertise, and to understand and meet needs. If by the year 2000 the availability and allocation of resources can match the encouraging verbal commitments voiced in recent years, then the whole African information community will be in a position to make less constrained and better considered decisions, and be able to take full advantage of state-of-the art technology for its own use. However, that million dollars still needs to be wisely spent!

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MARGOT BELLAMY is currently Head of Training and Development at CAB International. She previously served as Head of the Division of Natural Resources, Forestry, and Economics at CABI.

CONTACT ADDRESS:

Margot Bellamy
Head of Training
CAB International
Wallingford, Oxon OX10 8DE
UNITED KINGDOM
Phone: +44-1491-832111
Fax: +44-1491-83308
E-Mail: m.bellamy@cabi.org

Producing and Disseminating Information to the Agricultural Producers of NIS Countries

Isabelle Gachie

ABSTRACT: BDPA-SCETAGRI, a French consulting company, and its Russian partner, carried out a survey to the private and collective agricultural producers within 3 Russian regions. It was found that producing and disseminating extension documents is needed, because there is a shortage of this type of document in the various CIS republics. To overcome this problem, two technical booklets for agricultural producers were published and disseminated through local workshops. An agricultural newsletter in Ukraine at the Oblast (provincial) level was also published. The survey stressed that the post mail runs irregularly, that half of the private farmers have a phone and that travel between the work place and the nearest urban center is not easy. This survey also showed that the producers prefer both printed media and direct contacts with the information provider. The experience, both in Central Europe and in Western Europe, indicates the need to set up new information/training services that would be accessible and useful to the Russian and Ukrainian agricultural producers.

RESUMÉ: Le BDPA-SCETAGRI, bureau d'études français, et son partenaire russe RECON, ont mené une enquête auprès des producteurs agricoles privés et collectifs de 3 régions russes. Ils ont conclu à la nécessité de produire et de diffuser des documents de vulgarisation qui font actuellement défaut dans les diverses républiques de la CEI. Pour répondre à ce besoin, deux brochures techniques destinés aux producteurs agricoles, ont été publiées et diffusées dans le cadre d'ateliers locaux. Un journal agricole au niveau d'un oblast (province) d'Ukraine a aussi été publié. L'enquête a mis en évidence que les services postaux fonctionnent de manière irrégulière, que la moitié des agriculteurs privés disposent du téléphone, et que les déplacements entre le lieu de travail et le centre urbain le plus proche ne sont pas aisés. Cette enquête a aussi montré que les producteurs préfèrent à la fois le support écrit et un contact direct avec le diffuseur d'information. L'expérience acquise aussi bien dans les pays d'Europe centrale que d'Europe occidentale va nous permettre de proposer la mise en place de nouveaux services d'information/formation agricole qui soient accessibles et utiles aux producteurs agricoles russes et ukrainiens.

RESUMEN: La BDPA-SCETAGRI, una empresa francesa de consultorías, y su contraparte ruso aplicaron una encuesta a los productores agropecuarios privados y colectivos de tres regiones rusas. Se encontró que hace falta producir y difundir documentos de extensión porque hay una escasez de este tipo de documentos en las diversas repúblicas de la CIS. Para superar este problema, se publicaron dos folletos técnicos para los productores agropecuarios, las cuales se repartieron en talleres locales. También se publicó un boletín informativo sobre temas agrícolas en Ucrania a nivel de provincia. La encuesta resaltó que el servicio de correo funciona irregularmente, que la mitad de los agricultores privados tienen teléfono y que el desplazamiento entre el lugar de trabajo y el centro urbano más cercano es difícil. Esta encuesta indicó también que los productores prefieren los medios impresos y los contactos directos con el proveedor de la información. Las experiencias, tanto en Europa Central como en Europa occidental, indican que es necesario establecer nuevos servicios de información y de capacitación que sean accesibles y útiles para los productores agropecuarios rusos y ucranios.

Isolation in the Particular Case of NIS

The NIS countries[1] remained closed to the Western world for several years. For the last 4–5 years, these countries have been implementing political and economic reforms. The agricultural information system is also involved in these changes. This system still faces isolation from various points of view:

- *linguistically speaking*: A few people can speak a foreign language (particularly English) but all of the NIS countries speak Russian, even the Central Asian Republics. This fact becomes a problem when they want to use international information.

- *technologically speaking*: throughout the NIS countries, the main communication media is the mail; despite problems of delay, the majority of people receive information by mail. The other media do not work very efficiently; the telecom network is out-of-date and not everyone has their own phone line. To get information by phone or by fax is difficult and takes time; and the electronic network has still a restricted distribution.

- *geographically speaking*: this problem is mainly evident in the countryside and in the new States. In the former USSR, all the Republics had strong links with the "centre". But now, the new borders limit all kinds of exchange, including information. These States face big problems in obtaining documents. The countryside is also remote from the main sources and distances from the farms to the city are sometimes considerable (and few people have their own car).

- *culturally speaking*: to improve the access to professional information, NIS managers initially planned a big, centralized, computerised system, so complicated that it has remained at the planning stage. They are not used to

following a pragmatic approach that would start with small scale improvements. Another problem comes from the gap between scientists and producers; the information is often prepared by specialists for specialists and no effort is made to adapt results.

- *politically speaking*: the people from all the NIS countries suffer from a lack of objective information and they have some difficulties developing a critical point of view. These countries do not only face isolation problems; they have inherited other problems from the former system, as described below.

Agricultural Information Characteristics

Until recently, the agricultural information system was run in a centralized manner by the APK administration (APK: Agro-Industry Complex) under the joint responsibility of the Ministry of Agriculture and the Academy of Agricultural Sciences. Information was only produced and disseminated in the form of *instructions*. There was no advisory service and no choice given to the journals or books received. The instructions, and the various publications were prepared by scientists or academicians working in research institutes, often remove from reality in the field.

Research and information institutes collected documents and produced bibliographies with abstracts, managed databases (addresses, bibliographical references, seed varieties, patents, suppliers, …) and sent them to various libraries and administration. The regional and local administration disseminated the information to the collective farms. State publishing houses published and distributed the results of research. Agropromizdat was the biggest of these publishing houses and has been re-named Kolos.

It should be pointed out that all the information was produced and published in Moscow. The system was extremely centralised: agricul-

tural producers in all the different Republics received exactly the same data irrespective of the particular climatic and ecological conditions they faced. Any questions were sent through administrative channels to Moscow and processed there; an answer was retuned in due course. The high level of centralisation inherent to "Dissemination of Progress", the official term covering the information dissemination and extension processes, has always posed problems.

Current Situation

The State system no longer works; it has been unable to adapt to the new production conditions and, moreover, was never designed to deal with private farmers. The Information and Research Institutes have recently made efforts to improve the quality of their information but conditions are difficult. All these institutes face severe financial problems; they would like to sell their products but users have no wish to purchase them. Initially, it was thought that the collective farms could not pay; a more detailed investigation has revealed they would accept to pay for a quality product that provided relevant and rapidly applicable information. Hence, they have discovered one of the basic market laws for themselves! Administrative bodies, however, have difficulty in assimilating common sense observations and continue to make decisions without any regard for user consequences.

The following institutions still play a role in disseminating agricultural information:

The Academy of Agricultural Sciences continues to produce several specialised journals. Research results do not take into account field conditions. The journals we analysed were theoretical in tone, crop yields are often unrealistically high; a middle collective farm would be unable to ensure such yields due to lack of inputs and local agronomic conditions.

The Information and Research Institutes continue to produce bibliographical bulletins; their approach is still highly centralised: the information is processed in Moscow and then distributed at the Oblast (provincal) level.

The Training Institutes: the teachers have practically no access to new economic approaches and they receive very few foreign books and articles. However, it seems they are trying to listen to the producers' problems and work more closely with the farms.

Several newspapers have appeared over the last few years. In the agricultural field, most of them favour political aspects, but they are nevertheless trying to develop commercial and economic information. The situation in other NIS countries is worse because the new borders limit exchanges. These conclusions have been drawn from a survey carried out in 3 Oblasts. The main results of the survey are given below.

Survey Analysis

Target Groups – We carried out a survey of information needs in 3 Oblasts (Moscow, Riazan and Krasnodar) with approximately 80 participants. Target groups were as follows: private farmers, collective farm managers, regional agricultural administration officials, Agricultural Training Institutes: managers, teachers and agricultural students. Rather than send out the questionnaire, we discussed the questions with the particularly motivated people who had been recommended hoping to collect original and interesting ideas.

The people interviewed were all well educated. Most of these people receive mail. Their access to other communication media depends on their professional group: only 48% of private farmers have a telephone installed in their houses and private and collective farms have no fax machine and are not connected to any electronic network.

Figure 1 – Percentage of person who received information by information resources
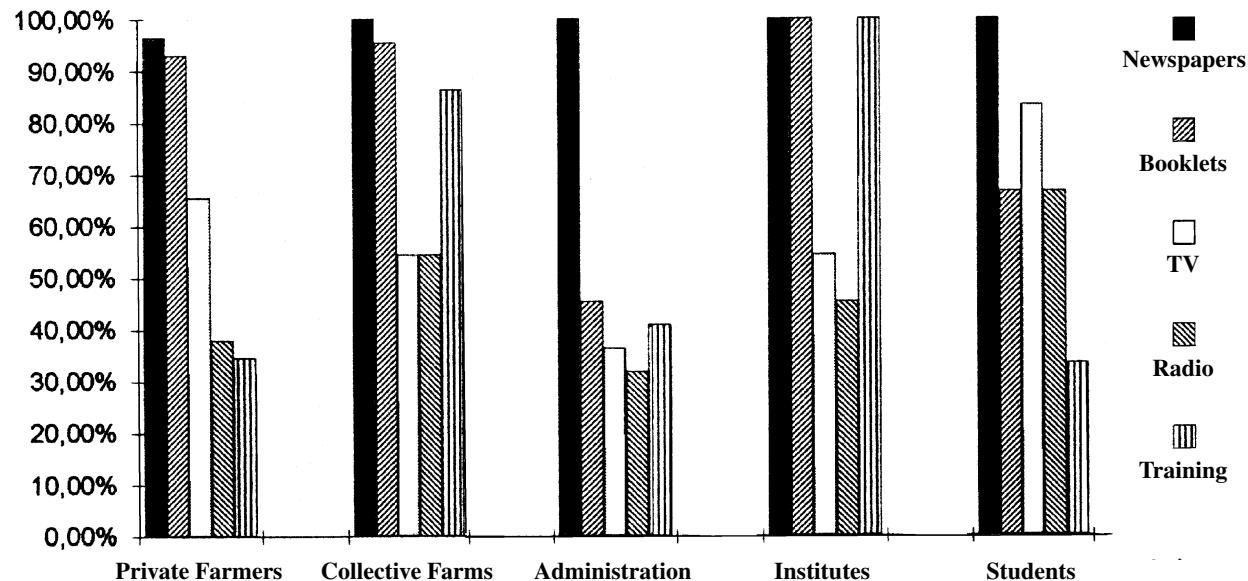
Characteristics of
the Current Information –

As may be seen from Figure 1, each group has access to various information sources/resources, essentially printed documents. Training seminars are the less used media.

Characteristics of
Each Information Resource –

These characteristics are given in decreasing order of importance:

• *Personal contacts*: An excellent way of getting information, data transmitted in this form are easy to understand and to apply.

• *Newspapers and personal libraries*: A good source of information; however data obtained in this way are currently difficult to apply.

• *Radio and television*: A good source of information, but data obtained in this way are not always easy to understand and to apply.

• *Technicians advises*: Collective producers and the administration rely on technicians but although the data they disseminate are easy to understand they are not easy to apply.

• *Fairs and exhibitions*: They are a good source of information, but the data is not easy to apply.

• *Research Institutes*: A good source but unfortunately they disseminate information that is difficult to understand and difficult to apply.

• *Training*: a source that is becoming less and less accessible; seminars disseminate information that is not easy to understand or apply.

• *Local administration*: Their data are neither easy to understand nor to apply.

• *Electronic network*: Only administrations and the Research Institutes have access to them.

• *User satisfaction*: Figures 2–5 show a difference between technical information and the two other types (commercial and economic). Globally, the people are partially satisfied with the received information.

Problems –

• *User's needs unfulfilled*: People made various comments about the information they can obtain. It is

Figure 2 – Level of satisfaction about technical information
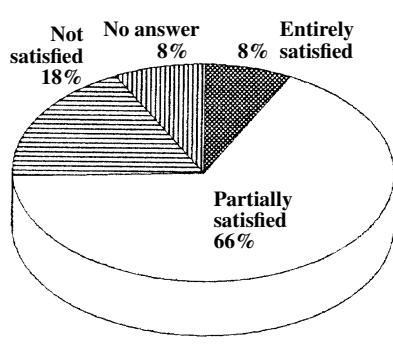
Figure 3 – Level of satisfaction about economical information
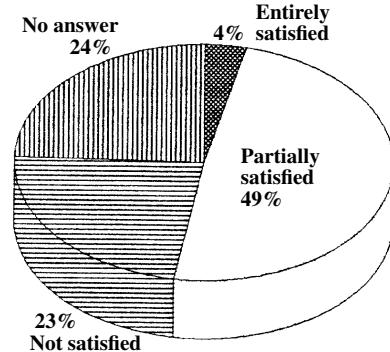
Figure 4 – Level of satisfaction about commercial information

Figure 5 – Desirable forms of printed information
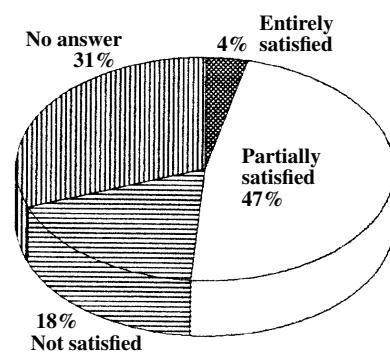
Figure 5 – Desirable forms of printed information
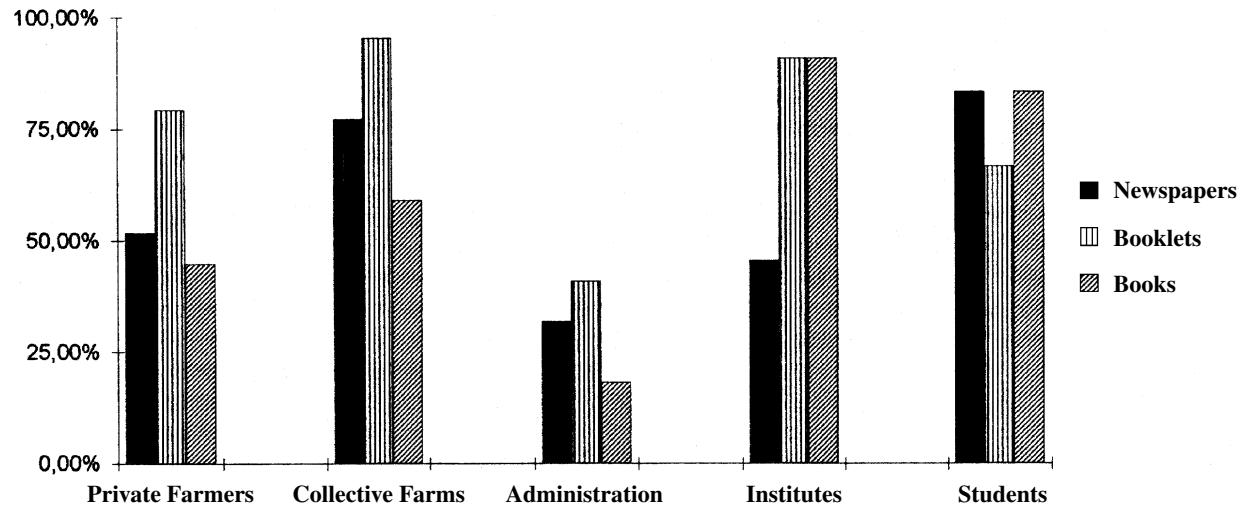
"not concrete", "too theoretical and academic", "divorced from the users' reality", "not applicable"…

• *Quality and availability of information*: People find it difficult to get good quality information. Frequent comments concerning information are that it is: "not reliable", "difficult to select" and a negative comment concerning Administration is also made: "Administration blocks initiatives and information."

• *Presentation of information*: Information should be presented in a straightforward manner, it must "brief and simple."

Characteristics of the Desired Information –

• *Contents:* Private farmers want to receive technical information that is oriented to small-scale units, crops and particularly conservation of agricultural products. They want information on management and organisation of small-scale farms abroad. It is the practical information that they want. Collective producers are interested in the technological aspects. They need economic information on financing, restructuring and concerning cost estimates. They also stress the fact that information must be adapted to local needs. These

groups do not require information from abroad. It is national or local data that they prefer.

To sum up, main needs are as follows: new technologies for crop production (grain, potato and vegetables); technology and equipment for storing and post-harvest processing; economic organisation and particularly reorganisation of agricultural enterprises; and information on agricultural product distribution channels (prices, suppliers…).

• *Preferred forms:* Both collective and private producers have a preference for direct contacts and technical booklets (see Figures 5 and 6). The majority of the people

Figure 6 – Desirable forms of not printed information

Figure 6 – Desirable forms of not printed information
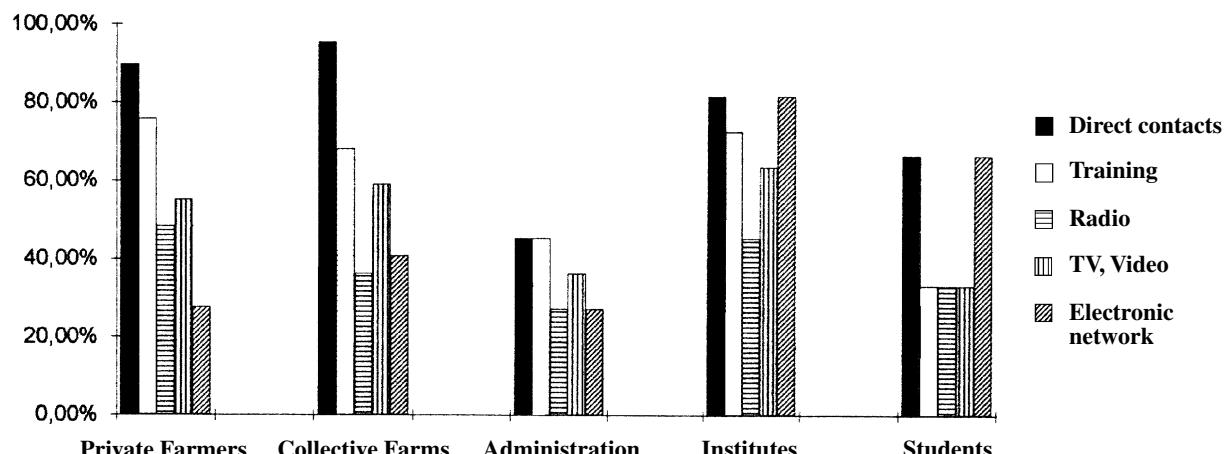
interviewed would accept pay for information products and services on condition they were really useful.

Recommendations

Private farmers suffer most from lack of information, have urgent needs in this respect but are not able to obtain and select what they want. Special attention should be given to their information requirements and to methods for disseminating the relevant information. Information should fulfill practical, local and technological needs while also including economic and commercial elements. It is currently not realistic to hope that producers will soon have access to electronic networks. At the local level, cheaper and simpler means of presenting information should be used.

Booklets describing a particular method or crop with illustrations that are both clear and informative are the most realistic solution to the problem. The booklets should be given directly to the user by a specialist who can comment on the information in the booklets and give advice on adapting the information to the user's particular situation (seminars, workshops and short-term training courses would reinforce the efficiency of this practice).

Any new producer-oriented informational network must take into consideration the existing networks of the regional administrative and training institutions and work with them wherever is possible. Existing facilities may be used as a source of information and specialists; however, the methods for disseminating of information among producers should be transformed.

Our Achievements

Following these conclusions, we decided to focus on the direct production and dissemination of professional booklets or newspapers. The setting-up of information services will be carried out later because it is essential to show new printed products with practical and local contents and attractive layout.

- *Realisation in Russia*: We decided to produce two extension booklets on potato for agricultural producers (collective and private farms). The first deals with planting and the second with storage. With our Russian partner, we defined the general contents and the main chapters. We delivered European booklets on the same subjects in order to have a model. The Russian consultants collected and wrote the different chapters in Russian and we checked the contents (after translation). We helped them with layout and provided photos (mainly from France). Five hundred copies of the first booklet were printed and disseminated through workshops. So far we have not had proper feedback but the first impressions of the readers are very good. We are preparing the second booklet and studying the profitability of publishing this kind of professional product (potential market, tarification). We are also finding local distributors in order to reach the users directly.

- *Realisation in Ukraine*: After the audit of the administration information centre, three people of the team decided to launch a professional newspaper for the agricultural producers of the Oblast. They decided to leave the administrative body and joined one of their former colleagues who had created a private consulting company (with TA-CIS[2] financing). With our assistance, they started by defining their targets and the general contents. The main idea was to sell enough issues to balance their budget. According to the marketing approach, they have to create a good product with interesting news and attractive presentation in order to find readers and encourage reader loyalty. They started to collect information and articles through their own network. Help was given in the heading, the general lay-out and advice was given on how adapt the published subjects to the seasons and agricultural work and to check all the information given by the articles authors. A budget was drawn up and calculated the average price of one issue. After launching the first issue, they got 250 subscriptions (the subscriptions are managed by a private distributor that also disseminates other newspapers by mail). The second issue was published and the third is ongoing. At present, I have no additional information about the financial situation. This experience shows that it is possible to create new information products meeting market requirements. Conditions for success include a motivated team who knows the users and their needs and a good network of resource people.

For the Future...

We recommend the following methodology for setting up efficient information services and products: as much as possible should be achieved at the local level; a working methodology should be experimented step by step with motivated partners; and tangible pilot actions should be carried out (such as production of booklets, newsletters and so forth).

Efficient information services must be based on the supply of both advice and information products. They serve as an interface between agricultural producers and the various informational sources. In order to be an efficient interface, they must:

- have a clear idea of the needs and realities of potential users,

- collect relevant information and, if necessary,

- adapt contents or produce adapted documents. Merely storing documents is sufficient; currently, in Russia, the required information is not found in existing books or journals. A particular effort has to be made to create new printed me-

dia and disseminate them through workshops. Producing other media is also a priority but requires increased human and financial means,

• interact with users, follow up their requests and so forth.

NOTES

1. The NIS countries cover the former USSR: Russian Federation, Ukraine, Belarus, Moldavia, Georgia, Armenia, Azerbaïdjan, Kazakhstan, Uzbekistan, Turkmenistan, Kyrghiztan, Tadjikistan.

2. TA-CIS stands for Technical Assistance in the NIS countries; it is the main European Union program in this region.

ISABELLE GACHIE is with BDPA-SCETAGRI, a private consulting firm, working worldwide in the field of rural development and environment. The Information Centre manages several documentary networks, publishes technical bulletins and carry out audit and analysis for the setting up of information services.

CONTACT ADDRESS:

Isabelle Gachie
BDPA-SCETAGRI
27 rue Louis Vicat
75738 Paris
Cedex 15
FRANCE
Telephone: +33-1-46-38-34-75
Fax: +33-1-46-44-75-44
E-Mail: gachie@cdi-bdpa.rio.org

Information for Research on Sustainable Agriculture in Tropical America: A Collective Challenge

Elizabeth Doupé Goldberg

ABSTRACT: As natural resource management research becomes more interdisciplinary there is a need to tap more diverse information sources. Much of the research and development output is found primarily in non-conventional or grey literature which provides valuable information on natural resource management relevant to local conditions in the neotropics. This information is generated by non-governmental organizations, development agencies and farmer organizations and is often held in researchers private collections. It is not systematically collected or analyzed, of limited or unknown distribution, in Spanish and Portuguese, and often does not go beyond institutional boundaries. Access to this information is essential for resource management research, development and educational activities, and policymaking. Analysis of international databases shows inadequate coverage of this information. Furthermore, these databases are not readily available to regional researchers, extensionists, producers, policymakers, and information personnel. There are language, financial, and training barriers that limit or prohibit access. This paper presents a project that challenges information providers, producers, and intermediaries in six Latin American countries to work in partnership to ensure recovery of and access to key sources through a range of communication channels.

RESUMÉ: Comme la gestion des ressources naturelles est de plus en plus interdisciplinaire, il faut faire appel à des sources d'information plus variées. La plupart des résultats de la recherche et du développement se trouve principalement dans la littérature grise qui fournit de l'information intéressante sur la gestion des ressources naturelles adaptées aux conditions locales en zone néo-tropicale. Cette information est générée par des ONG, des agences de développement ou des organisations de producteurs, et est souvent conservée dans les collections privées des chercheurs. Elle n'est pas collectée ou analysée systématiquement ; sa distribution est limitée ou inconnue, en espagnol ou en portugais, et souvent au seulement au sein de l'institution. L'accès à cette information est essentielle pour la recherche sur la gestion des ressources, les activités de développement et de formation, et la prise de décision. L'analyse des bases de données internationale révèle que cette information n'est pas suffisamment couverte, et que ces bases de données ne sont pas aisément accessibles pour les chercheurs, vulgarisateurs, décideurs, et spécialistes de l'information de la région. Il y a des contraintes linguistiques, financières et professionnelles, qui limitent ou empêchent l'accès. Cet article présente un projet qui défit les fournisseurs, producteurs et intermédiaires de l'information de six pays d'Amérique latine, de travailler en partenariat afin de récupérer les sources principales et y accéder par voies de communication.

RESUMEN: A medida que la investigación en el manejo de los recursos naturales se vuelve más interdisciplinaria, es necesarios aprovechar fuentes más diversas de información. Gran parte de los resultados de investigación y desarrollo se encuentra principalmente en la literatura no convencional o "gris". Esta literatura proporciona información valiosa sobre el manejo de los recursos naturales relevante a las condiciones locales en el neotrópico. Esta información es generada por las organizaciones no gubernamentales, las agencias de desarrollo y las organizaciones de agricultores y, a menudo, se conserva en las colecciones privadas de los investigadores. No se recolecta ni se analiza sistemáticamente; su distribución es limitada o desconocida; está escrita en español y portugués; y muchas veces no va más allá de los límites institucionales. El acceso a esta información es esencial para la investigación en el manejo de los recursos, en actividades de desarrollo y actividades educativas, y en la elaboración de políticas. El análisis de las bases de datos internacionales muestra que la cobertura de esta información es inadecuada. Además, estas bases de datos no están fácilmente disponibles para los investigadores regionales, los extensionistas, los productores, las formuladores de políticas y el personal de información. Hay barreras idiomáticas, financieras y de capacitación que limitan o prohiben el acceso. Este documento presenta un proyecto que reta a los proveedores, a los productores y a los intermediarios de la información, en seis países latinoamericanos, para que trabajen juntos para garantizar la recuperación de y el acceso a fuentes clave de información mediante un rango de canales de comunicación.

Background

There is an urgent need to increase food production while conserving natural resources, especially in the agroecological zones of well watered hillsides, forest margins, and lowland, acid-soil savannas in tropical America. In total, this represents an area of more than 141 million immediately accessible hectares where more than 80 million people live. The shift from strictly commodity oriented, high agrochemical input agriculture to lower

input and sustainable agriculture implies a shift to information-intensive agriculture. But there are gaps in the documented knowledge on components of sustainable agricultural systems, farmer decision-making processes, and land use policies both at the farm level and at more aggregate levels such as community or watershed. Researchers, extensionists, policymakers, and producers need information on these components in order to develop appropriate technologies and policy guidelines for more productive and sustainable land use. In particular, there is a need for more information on measurements and indicators of sustainability; economic and environmental costs of agriculture including the effect on biodiversity; recuperation of degraded soils; plant-soil interactions; cropping and production system prototypes; integrated pest management; socioeconomic policies; and indigenous knowledge, among other subjects.

As natural resource management research becomes increasingly interdisciplinary, there is a need to tap more diverse information sources. But access to this information is subject to many limitations. Valuable information relevant to local conditions is generated by non-governmental organizations, development agencies, governmental institutions, and farmer organizations. Typical of grey literature, it is scattered in diverse institutions. It is not systematically collected or analyzed and is not widely distributed—often not going beyond institutional boundaries. Still more information remains closely held in researchers' private collections.

Some organizations in the region conducting research or development work in resource management maintain documentation centers or databases with important local information, such as theses, annual reports, and technical bulletins. Several non-governmental organizations have built up substantial collections of observational data relevant to specific regions or problems. However, analysis of international bibliographic databases indicates that there is inadequate coverage of this information.

Finally, there is lack of communication between institutions and existing networks that are collecting information on related topics. This results in duplication of effort and incompatibility of information processing. The challenge is to link and harmonize these fragmented research support efforts.

Because research on sustainable agriculture and land management is interdisciplinary and widely dispersed among many organizations, it exceeds the scope of any single institution to provide comprehensive information support. In resource management research, consortia and ecoregional initiatives are being formed as a mechanism to more effectively plan and carry out complex research agendas common to many institutions.

The Consultative Group on International Agricultural Research (CGIAR) is in the process of restructuring its research activities into systemwide and ecoregional programs. The International Center for Tropical Agriculture (CIAT) has recently been designated by the CGIAR as a convening center for ecoregional research for tropical Latin America. As such, CIAT will play a lead role in seeking partnerships with national, regional, and international policy, research, and producer institutions to plan and carry out research that leads to better understanding of climate, soils, water and biological interactions for the agroecology, as a whole.

Many other ecoregional initiatives are being organized both at the CGIAR system level as well as at regional and global levels to manage the natural resource management agenda. CIAT is involved in at least three others which have an impact on tropical Latin America. These are the Managing Acid Soils (MAS) Initiative, Soil Water and Nutrient Management (SWNM) Research Initiative, and Alternatives to Slash and Burn.

Proposed Solutions

An ecoregional research initiative that covers such global problems as water, soil and nutrient use efficiency, soil loss, biodiversity, reduction of agriculturally-derived pollution of the environment, and climate change needs a new approach for the recovery of critical supporting information. This paper proposes a collaborative multi-institutional effort to identify, recover, and disseminate relevant information. The model already exists in the research consortia that are in formation. Participants, priorities, and needs have been identified. Information specialists in these same institutions have a comparative advantage to join forces to provide the required research information support.

Goal and Objectives – The overall goal of the proposed initiative is to contribute to the generation of technologies that increase sustainable agricultural production in fragile agroecosystems of tropical America. More specifically, the purpose is to improve the quality and efficiency of research and decision-making in resource management through improved access to local literature on conservation and sustainable agricultural use of forest margins, hillsides, and acid-soil savannas of the neo-tropics.

The primary objectives of such an initiative are:

- To link researchers and other information producers with information specialists in the effort to identify and document resource management literature of the tropics.
- To strengthen national institutional capacity for managing locally produced information.
- To promote rational access to and sharing of resources through the dissemination of information products.

Principal Activities – The activities of the proposed initiative focus on four areas: development of a network of participants; training of the information intermediaries and end-

users in information management; database development; and dissemination of database products and exchange of information.

Network Development – A principal output of the initiative would be a network made up of researchers or development specialists who produce and use the information, information intermediaries who document its content, and information providers who package and disseminate the final product. This would involve a series of activities such as the identification of and contact with key participants and development of mailing lists; development of a detailed search strategy based on priority topics for each ecosystem as identified by potential beneficiaries (Table 1); surveys of existing literature sources to identify gaps and targeted documents (Table 2); and development of mechanisms for electronic exchange of information and documents.

Training – The success of such a network depends in large part on trained information personnel—a second important output of the initiative. The training package would cover principles of information management including indexing and abstracting, organization of a database,

Table 1 – Sample Priority Topics for Targeted Ecosystems

1. Prototype combinations of system components including soil conservation practices, leguminous species for soil improvement, multi-purpose forage germplasm, agroforestry components in relation to representative production systems

2. Effects of soil conservation practices on the dynamics of nutrient cycling, biomass production, soil organic matter formation, plant growth and production

3. Soil water use

4. Control of soil erosion

5. Soil quality indicators

6. Maintenance of organic matter and soil fertility in integrated production systems

7. Sustainable food production for local consumption

8. Impact of agriculture (pesticides and deforestation) on soils and water

9. Economic and social costs of soil degradation

10. Farmers' decision-making about land use and technology choice

11. Development of markets for new products and their effect on resource conservation

12. Ecosystem characterization (socio-economic parameters, soil classification, climate, landscape, biodiversity assessment and land use)

electronic networking, and promotion and development of information products. Emphasis would be placed on compatibility with international standards and existing documentation methodologies. An expert system can be designed to assist researchers or other information producers to input their documents directly.

Database Development – The objective of developing a network and training information personnel is to build a database to ensure efficient access to the source documents—a third output of the initiative. This involves acquisition of the source documents, indexing and abstracting for local databases using a common, standardized methodology, exporting information for consolidation in regional and international databases, and maintenance of a centralized, back-up collection of all documents included in the database to guarantee efficient and effective document delivery. Electronic networks such as Internet would be used for rapid exchange of bibliographic records, communication, and transmission of full-text document images where the local infrastructure permits.

Dissemination of Information – The final output and the primary benefit to network participants is the dissemination of information. Information gathered would be distributed in current awareness bulletins,

Table 2 – Types of Documents to be Collected

1. Statistics on land area, yield, annual production of food crops, population, crop prices

2. Biophysical and socioeconomic indicators

3. Theses and dissertations

4. Research results or findings

5. Survey results

6. Data from experiments

7. Data on nutrient content and yield for food crops

8. Maps of soil, vegetation, crop distribution, etc.

9. Reports and studies

10. Proceedings of meetings

11. Farmer participatory evaluation studies

12. Economic assessments, including evaluation and impact studies

13. Policy documents and instruments

14. Indigenous environmental indicators

15. Extension bulletins

on diskette, on compact disc, and through network information servers. It would also be republished in international sources such as the AGRIS and CARIS databases, among others. There would be photocopy or electronic delivery service for documents in the collection. There would be directories of specialists and bulletin boards for stimulating exchange between researchers. Participants would have access, not only to their own institutional information, but to that of all the others. The benefits of participation would be tangible enough to sustain the initiative and ensure an incoming flow of documents needed to maintain the service and the databases in the future.

Figure 1 gives a breakdown of project outputs and activities.

Implementing Mechanism

To implement the initiative, a consortium would be formed. Multi-institutional and interdisciplinary in nature, the consortium would unite diverse institutions including national agricultural research systems, international research institutions, and information providers around a common agenda (Figure 2). Many of these institutions are already working together to jointly plan priorities for ecoregional research.

An information clearinghouse is recognized as an essential component of ecoregional research consortia to ensure that mechanisms are in place to link the efforts of researchers, policymakers, and farmers working on shared problems. The nucleus would be made up of information representatives from the same institutions involved in the research and development consortia. The information consortium or clearinghouse would be user-based, demand-driven, and built on needs and priorities already defined by research. Node institutions would be selected based on the concentration of relevant research or development activity and existing information infrastructure including collections of relevant literature.

To achieve the above goals, overcome the current limitations, and take advantage of new opportunities, the information consortium must apply the following principles:

- Efficiency: improved access to the literature to be achieved through task allocation based on institutional comparative advantage;
- Connectivity: enhanced electronic networking to ensure greater efficiency and effectiveness of information exchange;
- Harmonization: compatibility of technical standards is a prerequisite for connectivity and collective action, especially database production and electronic information exchange;
- Participation: equal partnerships will stimulate commitment to collaborative programs.

The consortium approach will challenge information providers and intermediaries to work in close partnership with researchers, planners and development specialists, as well as with other related networks, to

Figure 1 – Breakdown of Project Activities
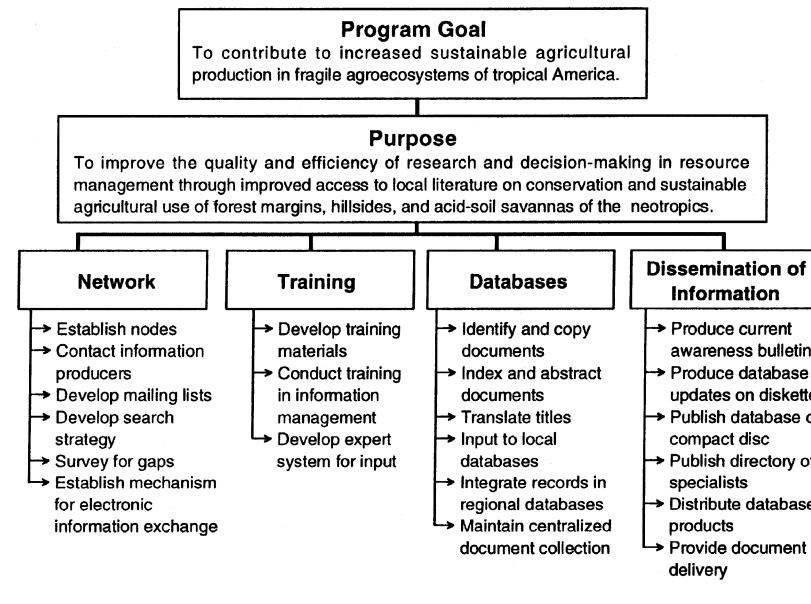
Figure 2 – Potential Consortium Participants
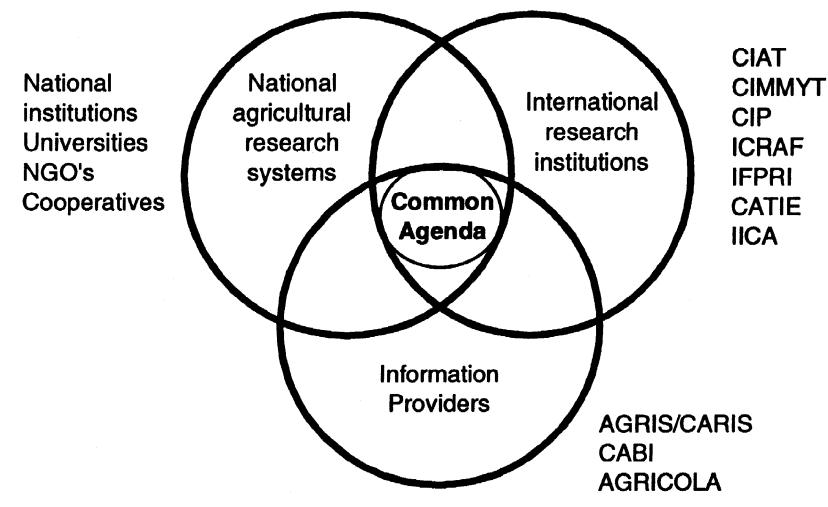
ensure the recovery of the most important information on sustainable agricultural production and land management.

Consortium Participants and Comparative Advantage

National Agricultural Research Systems – National agricultural research systems include national research and policy institutes, universities, NGOs, producer associations, and farmer cooperatives. These national institutes are the prime producers of valuable grey literature. They would have a comparative advantage to network with their own researchers and development specialists as well as with information producers in their respective countries, to identify the best sources of documentation, and ensure access to the information. National ownership is important to the success of the initiative.

International Research Institutions – International research institutions working in Latin America, such as CIAT, the International Center for Maize and Wheat Improvement (CIMMYT), the International Potato Center (CIP), the International Centre for Research in Agroforestry (ICRAF), the International Food Policy Research Institute (IFPRI), the Instituto Interamericano de Cooperación para la Agricultura (IICA) and the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), among others, develop and diffuse knowledge on resource management technologies in agroecosystems of tropical America. They also provide an institutional common ground where national programs can come together. International centers have a comparative advantage in project coordination, information technology and infrastructure, and extensive networks of national and regional research systems.

Information Providers – Information providers and publishers, such as AGRIS/CARIS of the Food and Agriculture Organization (FAO), the National Agricultural Library (NAL), and CAB International produce databases in support of agricultural research. AGRIS has a mandate for publishing the regional grey literature produced by FAO member countries in the AGRIS and CARIS cooperative databases. In addition, its multi-lingual documentation methodology, software applications to aid input, and broad distribution networks in developing as well as developed countries give FAO a comparative technical advantage.

Conclusion

The ultimate success of research and development efforts to improve sustainable agricultural production in tropical America will rely heavily on multi-institutional cooperation and sharing of valuable and unique information resources. Such cooperation will result in increased access at less cost. This will contribute to improved quality and efficiency of research, education, and decision-making. In addition, research results will become more visible and exert more impact.

The initiative will also increase connectivity and improve collaboration among national institutions, NGOs, and producer organizations. This, in turn, will lead to better coverage of local literature, less duplication of effort, and strengthened local capacity to maintain and use the databases in the future.

Finally, the initiative will increase the flow of information to researchers in universities and technical agencies outside the region interested in technologies that improve food production and conserve the natural resource base. It will also bring complementary international information into the region to complete the multi-lateral information flow.

An initiative built on the principles of efficiency, complementarity, compatibility, and equal partnerships has a good chance of succeeding. So does one where the information producers and end-users, as well as the providers, are key players in the partnership from the very beginning.

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ELIZABETH GOLDBERG is Head of the Information Unit at CIAT.

CONTACT ADDRESS:

Elizabeth Doupé Goldberg
Centro Internacional de Agricultura Tropical (CIAT)
Apartado Aéreo 6713
Cali, COLOMBIA
Telephone: +572-445-0249
FAX: +572-445-0273
E-Mail: e.goldberg@cgnet.com

Latin American Regional Initiatives in Agricultural Information

Edith Hesse

ABSTRACT: In 1972, the Latin American Association of Agricultural Librarians and Information Specialists (AIBDA), with support from the Inter-American Institute for Agricultural Cooperation (IICA), established AGRINTER, the Regional System for Agricultural Information for Latin America and the Caribbean; and in 1975 AGRINTER was linked to AGRIS, under intergovernmental agreements with FAO. In 1986, IICA ended its support to AGRINTER and reduced its support to AIBDA, unfortunately before many national programs had consolidated their information structures. Some were not able to continue their own national agricultural information systems. The paper reports on several current agricultural information initiatives in Latin America such as those initiated by AIBDA, the US-National Agricultural Library (NAL), the Inter-American Development Bank (IDB), IICA, CAB International and the Kellogg Foundation.

RESUMÉ: En 1972, l'Association des bibliothécaires et des spécialistes de l'information agricole de l'Amérique latine (AIBDA), a créé avec le soutien de l'Institut inter-américain de coopération en agriculture (IICA), AGRINTER, le système régional de l'information agricole pour l'Amérique latine et les Caraïbes ; et en 1975, AGRINTER a fusionné avec AGRIS, sous les accords inter-gouvernementaux avec la FAO. En 1986, IICA a arrêté son soutien à AGRINTER et réduit son soutien à AIBDA, malheureusement avant que de nombreux programmes nationaux aient consolidés leurs structures d'information. Certains pays n'ont pas pu continuer leur propre système national d'information agricole. Cet article fait le compte rendu de plusieurs initiatives en Amérique latine, telles que celles de l'AIBDA, de la Bibliothèque Nationale de l'Agriculture des Etats-Unis (NAL), de la Banque inter-américaine de développe-

ment (IDB), de l'IICA, de CAB International et de la Fondation Kellogg.

RESUMEN: La Asociación Interamericana de Bibliotecarios, Documentalistas y Especialistas en Información Agrícola (AIBDA) estableció AGRINTER el Sistema Regional para la Información Agrícola para América Latina y el del Caribe en 1972, con el apoyo del Instituto Interamericano para la Cooperación Agrícola (IICA). En 1975, AGRINTER se unió a AGRIS mediante convenios intergubernamentales con la FAO. En 1986 el IICA retiró el apoyo que daba a AGRINTER y redujo el apoyo a la Asociación, pero desafortunadamente antes de que muchos programas nacionales hubieran consolidado sus estructuras de información. Muchos de estos programas no pudieron continuar con sus propios sistemas nacionales de información agrícola. El documento informa sobre varias iniciativas de información agrícola que se desarrollen actualmente en América Latina, como las iniciadas por la AIBDA, la Biblioteca Agrícola Nacional de los Estados Unidos (NAL, su acrónimo en inglés), el Banco Interamericano de Desarrollo (BID), el IICA, el CAB International y la Fundación Kellogg.

ORGANIZERS OF THIS CONGRESS have invited me to address the issues of regional agricultural information systems in Latin America. For all of us in the region who work as agricultural information specialists, it is clear that the situation as it currently stands, is unsatisfactory; several initiatives are now underway to find appropriate solutions. The best way how to organize a viable agricultural information system is still under discussion and what I am reporting here is the current status of activities and some outcomes.

These however, may change as discussions progress further.

Antecedents

Beginning in the 1950s the Latin American agricultural information professionals have accumulated a rich and rewarding experience in working together in regional information activities. With financial support from the Inter-American Institute for Cooperation on Agriculture (IICA), the *Bibliografia Agricola Latinoamericana* was produced and published from 1966 to 1975 by the Latin American Association of Agricultural Librarians, Documentalists and Information Specialists (AIBDA). To strengthen regional cooperation IICA promoted the establishment of a formal Regional Agricultural Information System for Latin America and the Caribbean called AGRINTER. In 1972 formal agreement was reached with 21 countries in the region to send input to a regional agricultural database to be maintained and processed by IICA's in-house information and documentation center, CIDIA. To introduce the necessary regional bibliographical norms and train librarians and documentalists, IICA began an extensive training program in cooperation with AIBDA and financed by International Development Research Centre (IDRC) and IICA. In addition the program provided technical assistance, performed diagnostic studies, and assisted in project formulation. In 1975, agreement was reached with FAO that

CIDIA become the regional coordinating center for Latin American input to FAO's worldwide AGRIS network using the AGRINTER network and database.

In 1982, based on financial considerations, IICA began a gradual transfer of responsibility for the AGRINTER network and its products to the countries. Unfortunately the transfer had to begin at a time when many national programs had not yet developed sufficiently strong information infrastructures to continue their own national agricultural information systems. In 1986 IICA suspended its support to AGRINTER and supported at a reduced scale AIBDA and it spelled disaster for the regional effort. With the disappearance of IICA and diminished presence of AIBDA, there was no central coordinating mechanism to carry out collaborative activities and training events. The countries with more advanced national coordinating centres began to send input directly to AGRIS. The less developed centers ceased participation in AGRIS or participated at a much reduced rate.

Today, there are several more specialized initiatives, limited by subject or by geographic scope but these are no substitute for the broad-based cooperation originally conceived by IICA and AIBDA. Unfortunately the more specialized initiatives often compete for available resources, both financial and human. This paper deals only with the broader initiatives that are intended for the entire region and the full gamut of the agricultural sciences.

Recent Initiatives for Information Work in the Region

Inter-American Planning Workshop for Information Transfer and Networking – The urgent need to coordinate and strengthen agricultural information activities was discussed in detail at the Inter-American Planning Workshop for Information Transfer and Network-

ing which was organized jointly by the National Agricultural Library (NAL), the Inter-American Development Bank (IDB) and AIBDA and held in Washington, D.C. in January 1994. The results of the one-week intensive group discussions, technology demonstrations and presentations have recently been set down in draft form as the *Regional Plan for the Establishment of an Inter-American Agricultural Information Network* (Draft 1994). The plan underlines the need to rescue positive experiences from the past and to design a creative, solid and sustainable information infrastructure for the agricultural sector in the region. Regional networking is seen to be viable only to the extent that national agricultural information systems are strong and attuned to the needs of local agricultural communities and shareholders. Based on this plan, AIBDA with support from IICA, has developed a proposal for a regional agricultural information system, and intends to present it to various donors.

CABI Proposal – At the tenth meeting of AIBDA in Santiago de Chile in November 1993, the former Director General of CAB International, Doug Laing, presented a proposal to set up a Regional CABI Office which would start processing Latin American agricultural literature and promote distribution of CABI products. In his proposal, he also offered to produce a CD-ROM covering the Latin American literature so far indexed in CAB ABSTRACTS and to start training activities.

Latin American information specialists discussed the proposal in detail at the above-mentioned Inter-American Planning Workshop for Information Transfer and Networking and were not convinced that they should support CABI's request for a grant from the Inter-American Development Bank (IDB). They felt that if CABI were to start processing Latin American literature: it would keep the copyright; it would reduce incentives to build national

capacities and national information systems (contrary to the goal of "self-reliance"); by being selective, it would emphasize some literature while condemning everything else to greater obscurity; by replacing AGRIS methodology with CABI methodology in its training programs, it would sow confusion among those many library and documentation systems that are based on AGRIS bibliographic descriptions, classification and AGROVOC indexing; it would depend on short-term donor financing and, therefore, put at risk the long-term availability of its products at prices affordable in developing countries.

To compile and process the Latin American agricultural information is a task of such a size that the Workshop participants believed it could be handled only through well organized national cooperative systems. The processing of a relatively small quantity of Latin American literature by a not-for-profit but still sales-oriented information provider like CABI would confuse the issue and certain decision-makers. The recommendation of the Latin American information specialists, therefore, was that the money requested from IDB would be better spent to speed up work related to the multilingual aspects of the Unified Agricultural Thesaurus, a joint project among NAL, FAO, and CABI. According to personal communications received from CABI, most of these concerns have been reflected in a new version of the proposal which is currently under review by IDB for potential funding support.

Kellogg Foundation – The Kellogg Foundation, which intends to launch a new rural development initiative aimed at higher-education institutions in Latin America and The Caribbean, sees information as an important component of this initiative.[1] Given the Foundation's successful involvement in the Latin-American Health Information System coordinated by Pan-American Health Organization (PAHO) and

Biblioteca Regional de Medicina (BIREME), representatives of the Foundation have expressed interest in supporting and promoting the reactivation of a functional agricultural information system in Latin America. They have indicated particular interest for projects to enhance national agricultural information infrastructures, and such projects should have a strong service component with creative built-in solutions for reaching users in rural communities.

To get discussions started on a broader basis, the Foundation asked AIBDA to identify 18 agricultural information specialists from higher-education institutions in Latin America and invited them to the tenth meeting of AIBDA. As a second step, the Foundation arranged a working meeting in Sao Paulo, Brazil, in which professionals from BIREME, AIBDA, FAO, NAL, and Centro Internacional de Majoramiento de Maíz y Trigo (CIMMYT) analyzed the similarities and differences between the existing agriculture and health information systems. Some obvious differences were noted, namely that information in the health sector is usually much more universally applicable, and that the users are doctors and health professionals, whereas in the agricultural sector the information is more site-specific and the users are much more diverse (agronomists in the private and public sector, producers, extensionists and so forth). In addition, much of the health sector literature is included in medical journals, whereas much of the agricultural literature is reported in a broad range of non-conventional documents. In the health sector there was no pre-existing global information system with a mandate to record the conventional and non-conventional documents from the countries of Latin America and therefore, BIREME was set up to do this for the first time. Whereas in the agricultural sector the worldwide AGRIS database already existed and consequently it seemed rational to build on this existing database and use its already widely available methodology.

Nowadays regional information management and networking in the health sector seems to be flourishing, and information services, including the Latin American Health CD-ROM (LILACS), are becoming available at remote hospitals in rural areas. Similar efforts in the agricultural sector have stagnated during the last decade. Health information professionals who were consulted pointed to the continuous coordinator role that the regional health information center BIREME has played in strengthening national health information systems, particularly during times of rapid technological advance. BIREME has been able to play this role because of secure and long-term funding from PAHO and the government of Brazil, as well as the support it received from the Kellogg Foundation and Canada's IDRC.

As the third step, and to discuss the need for a regional coordinating center, the Foundation sponsored a working session at IICA, the only institution in the region with a broad mandate in agriculture and with offices in each country. In this working session, three external consultants together with three IICA information specialists prepared guidelines for information work at IICA. These have been included in IICA's Medium Term Plan which has been approved by agricultural ministers of its 33 member countries in September 1994 (Arias et al. 1994).

Results of Ongoing Initiatives

Most information specialists agree that a viable regional agricultural information system must be highly decentralized putting the responsibilities into the hands of the national cooperating centers within each country. There is also agreement that a regional coordination center is needed and that it should act as a facilitator and convener, perhaps as a center for training, but that it should not be expected to construct bibliographic data for national publications. A viable regional agricultural information system will need strong institutional support, long-term funding and strong leadership if it is to succeed in fostering the construction of strong national agricultural systems.

Information specialists suggest that IICA should re-initiate its coordinator role and should form strategic alliances with regional and international institutions such as FAO, United Nations Educational, Scientific, and Cultural Organization (UNESCO), CIMMYT, Centro Internacional de la Papa (CIP), Centro Internacional de Agricultura Tropical (CIAT) and Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), as well as with NAL.

To most, it is obvious that a Latin-American database is needed and that it should be made available also to users in remote rural areas (following the model of the health sector). Such a database should be produced by enhancing national inputs to the worldwide AGRIS database and then extracting both the material published in the region as well as the material concerning the region that is published elsewhere. National systems would have to be strengthened to ensure the compilation of all information produced in their countries. These national systems would also have to ensure the availability of the national, regional and global (AGRIS) databases for national users.

Given that the AGRIS methodology is already widely used in the region, and that even the strongest national system in the Americas, namely that of the USA, actively participates in AGRIS, there seems to be no doubt that AGRIS offers the most viable framework for the system. In addition, given that many other information initiatives are already using the UNESCO-based CDS/ISIS software for their respective databases, it is this software that should be used and promoted in current database building efforts.

Conclusions

This paper was prepared several weeks before the Congress, and it is based largely on discussions that took place in 1994. More recently, Mr. Finn Damtoft has taken over as Director of Information, Documentation and Training at IICA. In the course of our exchanges during the first weeks of 1995, he has asked me to record IICA's renewed interest in information. Clearly it is now to be hoped that IICA will again take up the leadership role in strengthening regional cooperation.

NOTES

1. A preliminary version of "UNIR: Una propuesta para el desarrollo" has been circulated for discussion.

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EDITH HESSE is Head of the Scientific Information Unit, CIMMYT, Mexico.

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CONTACT ADDRESS:

Edith Hesse
CIMMYT Scientific Information Unit
Apartado Postal No. 6-641
06600 Mexico D.F.
MEXICO
Telephone: +52-5-726-9091
Fax: +52-5-726-7558
E-Mail: ehesse@cimmyt.mx

Brazilian Agricultural Science Citation Index—IBCCAg: Preliminary Results

Fernando C. Peres, Janeti L. Bombini de Moura, Angela R.P. e Peres, Sonia Correa da Rocha, and Jose Luiz Boscariol

ABSTRACT: The project objective is to develop an index of citations in agricultural science (IBCCAg) similar to Science Citation Index (SCI) published by the Institute of Scientific Information. The IBCCAg will be complementary to SCI. The additonal database is necessary due to the locational characteristics of the agricultural sciences especially in its applied part. To present a total of 76,330 entries/references are compiled for twelve Brazilian periodicals published from 1985 to 1992. These titles were found to be among the most important source of publications for genetics specialists in Brazil. Genetics was chosen as the first agricultural science area to be compiled.

RESUMÉ: L'objectif de ce projet vise à développer un index de citations en sciences agronomiques (IBCCAg), semblable à l'Index de Citations scientifiques (SCI) publié par l'Institut d'Information scientifique. L'IBCCAg sera complémentaire à SCI. Cette base de données supplémentaire est nécessaire, suite aux caractéristiques géographiques des sciences agronomiques, en particulier des sciences appliquées. A présent, 76.330 références/entrées ont été compilées provenant de douze périodiques brésiliens publiés entre 1985 et 1992. Ces titres se sont avérés être parmi les plus importantes sources de publications pour les généticiens au Brésil.

RESUMEN: En el presente trabajo se presentan los resultados preliminares de un proyecto que tiene por objetivo el desarrollo de un sistema dé indices de citaciónes en ciencias agrarias (IBCCAg) semejante al *Science Citation Index* (SCI) publicado por Institute of Scientific Information. El IBCCAg tenderá características complementares al SCI, permitiendo la incorporación de publicaciones periódicas en ciencias agrarias del Brasil. Esta complementación es necesario devido a las características de localización presentadas por las ciencias agrarias, principalmente en relación a su aplicabilidad. Hasta el momento fueron incluidos en la base 76.330 registros/ referencias, 1985–1992. Estos títulos fueron considerados los vehículos más importantes para los especialistas en genética del Brasil. Genética fue la primera área escogida para iniciar la presente compilación, dentro de las ciencias agrarias.

Introduction and Problem Situation

When J. Blickenstaff and M. J. Moravcsik (1982) submitted the article "Scientific Output in the Third World" for publication in *Interciencia,* a Venezuelan journal, publication was denied on grounds that the Institute for Scientific Information (ISI) output was not large enough to represent Latin America scientific production. The article was published by *Scientometrics* and the authors admitted that not only Latin America but underdeveloped countries' scientific production in general are not sufficiently represented in the ISI database. The authors "have therefore been suggesting for some time to various appropriate people in the developing countries that these countries, singly or in groups, initiate their own computerized compilation of journals, authors, publications and perhaps even citations." (Blickenstaff & Moravcsik, 1982, p. 135). They suggest that those compilations will be of international value but will also be valuable for national scientific policy making and in evaluation of the scientific production of researchers and institutions.

In Brazil, several institutions are compiling the scientific production of authors and of institutions. However, there is no systematic compilation of citations although the possible impact of this type of index would be great especially for the Agricultural Sciences. Agricultural Sciences, differently from other sciences, are singular in terms of geographical location, especially in the applied areas. Their singularity is due to the diversity of soil and climate conditions that characterize agricultural production. Even in developed countries, agricultural scientific journals tend to be underrepresented in scientific compilations (Beilock and Polopolus, 1988). Regional journals of the USA that publishe research results in Agricultural Economics, for example, are not compiled in the Social Sciences Citation Index (SSCI). Since they report mainly regional results their impact is restricted and they are not cited enough in other journals.

If a journal does not have enough articles frequently cited in other periodicals it will not satisfy the criteria that warrants its inclusion in the ISI indexes. Therefore, Agricultural Sciences journals from less developed countries will, in general, not satisfy the conditions to be included in those indexes. In fact, until 1992 ISI's *Science Citation Index* (SCI) and *Social Science Citation Index* (SSCI) compiled publications of from three journals from Brazil in all areas of knowledge. This definitly

does not do justice to the scientific production of the country.

In certain areas of knowledge, such as the basic sciences, publication of scientific papers by brazilian scientists in international journals is common and desirable. In other areas, like in the agricultural sciences, papers barely present enough fundamentals to suggest publication in foreign journals. A few papers will warrant publication in international journals but most deserve only local attention and should be published in periodicals with local scope.

Objective

The objective of the study is to report the development of an Index of Citation in Agricultural Sciences for Brazil (IBCCAg) similar to *Science Citation Index*. The IBCCAg have similar characteristics to SCI but will increase its base through the incorporation of Brazilian scientific periodicals. It will be useful in two ways: as research and bibliographic review tool and as an instrument able to introduce objective elements to the assessment of the impact of scientific papers.

In reviewing the literature, the use of citation indexes are of great value. Starting with a basic published paper one can follow the authors or papers that criticized or followed its line of thought. A tree can then be built, showing the papers/authors that worked in a given line.

Citation Indexes can also play a relevant role in the evaluation of research quality. Financial resources used by agricultural scientific research are part of a limited amount of resources that public and private institutions allocate to the development of science. Society wants to maximize returns on these resources. It is necessary that society can assess the usefulness of the work that is utilizing its resources. Citation Indexes allow an objective way to measure the impact of a research. As suggested by Garfield (1979) citation analyses are proper instruments to evaluate the quality of a research because

it is based on peer evaluation.

Through citation analyses one can assess the usefulness of a paper (Garfield, 1979). This evaluation can be complementary in the process of allocating resources by public institutions. It can be used in evaluating the work that is done by researchers or institutions. In developed countries or even in Brazil, and for certain areas of knowledge where a higher percentage of papers are published in international journals, the number of citations received by a researcher is commonly shown in the researcher's vita. The number of citations received by a researcher has been shown to be highly correlated with the quality of the work of the author. As any other quality assessment method, on the other hand, citation index has its weakness and should be used in conjunction with other procedures.

Limitations of the IBCCAg

Among the limitations of citations indexes as a quality of research assessment tool is the fact that only scientific periodicals are used in compiling the indexes. Papers published in books, in magazines, or any other periodicals, may have great impact in improving people's life and not be shown in citation indexes. It follows that citation indexes should be used only in evaluating the impact of a scientific paper in other works developed by members of the academic world.

The impossibility of separation of the positive from the negative citations is another limitation associated with using citation indexes as research's quality evaluation tool. Journals have editorial referees that evaluate the quality of the submitted papers. On the other hand, the ideal verdict about a paper takes place only after publication, when the entire academic community that works with that specific subject knows about it. The indication by any author about the weakness of the paper, not noticed by journal referees will, in general, stop the

flow of citations to the paper. The flow may begin again if some kind of rehabilitation occurs. Negative citations allow, therefore, for correction of uncareful refereeing.

Self-citations are also pointed out as limiting the power of citation indexing to assess quality, impact, or usefulness of a paper. They may be excluded in building the indexes if one thinks self-citations bias the results. In fact, exclusion of self-citations has been found not to change the results of citations indexes in assessing a paper's impact (Beilock, Polopolus and Correal, 1986; Beilock and Polopolus, 1988).

As indicated by Velho (1989), decorative citations—these added to papers to show the author's familiarity with the field—would also lower the value of citation indexes. This should be no problem if referees for the journals do a good job in weighing the amount of citations and the scope of the paper. In general, referees for scientific journals are asked to determine how appropriate are the citations of a paper.

ISI's SCI and SSCI indicate only first authors production. There is a considerable amount of research being done to determine whether considering only first authors will change the rankings of individuals. In order to be consistent with SCI and SSCI, IBCCAg will report results only by first authors. The number of citations received by a paper can be evaluated in any of these indexes and, therefore, co-authors citations can be counted.

Using citation indexes as an auxiliary criteria to evaluate the impact of a paper (and of authors and institutions, by consequence) has limitations but they do not invalidate its use. On the other hand, citation indexes may be an important tool in literature review that warrants its usefulness.

Methodology

Although the duration of this project is not determined, we will proceed on detailing actions taken to

implement its first years. Three basic steps are being developed with some overlapping among them: the first, deals with selecting the journals that would be compiled for the citation index (Appendix 1); the second, deals with writing and debugging the necessary software; and the third deals with compiling the data and publication of the citation index.

Two basic criteria were followed in selecting the journals to be compiled: first, the group of journals that have a body of referees were selected from the list published by the Brazilian Institute of Science and Technology Information—IBICT—(Instituto Brasileiro de Informacao em Ciencia e Tecnologia); second, directors of professional scientific societies in such areas as genetics, soil science, entomology, animal science, veterinary, and economic and rural sociology were consulted. The final selection of the periodicals depend on the compilation results. Journals "closed" into certain institutions, and that are not cited in papers published by other periodicals, will not be part of the IBCCAg. This procedure follows The Institute of Scientific Information's selection criteria.

Presently periodicals will be evaluated according to the number of citations received by their papers in other journals. This will bring a dynamic characteristic to IBCCAg. Although the criteria is similar to the adopted by the ISI, the degree of cross-citation required by IBCCAg will be much lower than the required by either SCI or SSCI. One must keep in mind that the IBCCAg deals with Agricultural Sciences that are much more sensitive to local conditions than general science indexes.

Periodicals not available at Campus Libraries are being secured through interlibrary loan. Initially, eight years of publications (1985–1992) were compiled for twelve titles. It is estimated that 210 titles will be compiled when IBCCAg covers all areas of agricultural sciences. Similar to ISI indexes, a first book with the consolidated first five years (1985–1989) citations will be published. A yearly publication for IBCCAg will follow thereafter.

Preliminary Results

Twelve Brazilian journals were compiled for the period 1985–1992 with over 75,000 references collected. Genetics was chosen as the first area of agricultural sciences to be compiled into the IBCCAg. Starting with periodicals registered in the Brazilian Institute of Science and Technology Information (IBICT—Instituto Brasileiro de Informacao em Ciencia e Tecnologia), members of the Brazilian Society of Genetics and professors of the Department of Genetics of The College of Agriculture (ESALQ) of University of Sao Paulo were interviewed and asked to indicat the journals they use to publish in or consult more frequently. From the list those periodicals that were listed as part of ISI indexes were eliminated and twelve journals were used for compilation (Appendix 1).

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APPENDIX 1

Brazilian Journals Already Compiled for IBCCAg—

Ciência e Cultura

Horticultura Brasileira

Pesquisa Agropecuária Brasileira

Revista Brasileira de Biologia

Revista Brasileira de Botânica

Revista Brasileira de Fisiologia Vegetal

Revista Brasileira de Genética

Revista de Microbiologia

STAB Açúcar, Álcool, Subprodutos

Revista da Sociedade Brasileira de Zootecnia

Fitopatologia Brasileira

The authors are located at the Escola Superior de Agricultura "Luiz de Queiroz"-ESALQ, Universidade de Sao Paulo—USP, Piracicaba, SP, Brasil.

CONTACT ADDRESS:

Janeti L. Bombini de Moura
Universidad de Sao Paolo
Campus Luiz de Queira
Div. Biblioteca e Documentacao
Caixa Postal 9
Piracicaba SP CEP 13418-900
BRAZIL
Telephone: +55-194-22-5913
Fax: +55-194-33–2014
E-Mail: jlbmoura@jau.esalq.usp.br

Propuesta de un Modelo de Desarrollo para el Sistema Nacional de Informacion Agricola en Mexico

Miguel A. López-Pérez,
Leticia Rosete-Vela

ABSTRACT: Despite progress in both the public and private sectors, a National Agricultural Information System for Mexico has not yet been developed. Current agricultural information centers in Mexico function independently and informally without a formal organization for coordinating services and activities for its users. As such, the present document attempts to identify the key factors in developing a National Agricultural Information System, analyzing general theories and proposing a model for implementation. A national system would coordinate the organization and processing of agricultural information and would facilitate studies by researchers, professors, students, extension centers, and decision makers. It would also allow Mexico to work more efficiently with its trading partners and with other international agricultural organizations, all for the benefit of the national economy.

RESUMÉ: Malgré les progrès réalisés dans les secteurs publics et privés, il n'y a pas encore de système national d'information agricole au Mexique. Les centres d'information agricole actuels fonctionnent de façon autonome et informelle, sans mécanismes de coordination des services et des activités au profit des utilisateurs. Le présent document s'attache à identifier les facteurs clés pour le développement d'un système national d'information, et se fondant sur les théories, propose un modèle de mise en oeuvre de ce système. Un système national assurerait la coordination de l'organisation et du traitement de l'information, et faciliterait les études des chercheurs, des professeurs et étudiants, des services de vulgarisation et des décideurs. Ce système permettrait également au Mexique, de mieux collaborer avec ses partenaires commerciaux et d'autres organisations internationales au profit de l'économie nationale.

RESUMEN: A pesar de los avances de los sectores público y privado, México aún no ha desarrollado un Sistema Nacional de Información Agrícola. Los actuales centros de información agrícola de México funcionan de manera independiente e informal, sin una organización formal que coordine los servicios y las actividades para sus usuarios. En el presente documento se intenta identificar los factores clave para el desarrollo de un Sistema Nacional de Información Agrícola; se analizan teorías generales y se propone un modelo para su respectiva implementación. El Sistema Nacional coordinaría la organización y el procesamiento de la información agrícola, y facilitaría la realización de estudios por parte de los investigadores, los profesores, los estudiantes, los centros de extensión y los funcionarios encargados de la toma de decisiones. Un sistema así diseñado permitiría que México trabajara más eficientemente con sus socios comerciales y con otras organizaciones agrícolas internacionales, en beneficio de la economía nacional.

Eｘｉｓｔｅｎ ｍｕｃｈｏｓ documentos sobre la planeación y diseño de sistemas nacionales de información, sin embargo todos responden a diferentes políticas económicas y sociales, dependiendo del país de que se trate; por lo tanto el presente trabajo está fundamentado en los modelos de CEPAL, UNESCO, documentos regionales sobre información agrícola y ciencias de la salud, además de ser el producto de la experiencia de más de diez años de trabajar en este sector, por ello sólo se pretende mostrar los elementos y conceptos más importantes a considerar en un proyecto sobre el planeamiento de un *Sistema Nacional de Información Agrícola*. Esto es sólo un primer intento, que deberá mejorarse, para lo cual requerirá de la participación entusiasta de los bibliotecarios y especialistas en información agrícola para poder lograr un proyecto formal y definitivo que pueda ser presentado ante las autoridades de la Secretaría de Agricultura y Recursos Hidráulicos de México, sobre todo en estos momentos en que se vuelve una necesidad imperante el trabajar de manera cooperativa y organizada, debido a la fuerte crisis económica por la que atraviesa el país desde el pasado mes de diciembre como consecuencia de la devaluación de nuestra moneda.

La estructura desarrollada se puede describir de la siguiente manera: la primera fase es un panorama general de México, que incluye el sector agrícola nacional, la infraestructura académica en ciencias agrícolas, una breve descripción de las colecciones biblio-hemerográficas más importantes. En una segunda fase se describe la cooperación interinstitucional que desde hace algunos años se practica entre las diversas unidades de información agrícola. Posteriormente y utilizando el análisis de sistemas como metodología para establecer un *Sistema Nacional de Información Agrícola*, se plantean la justificación y objetivos para el desarrollo del mismo. A continuación se formula la pro-

puesta y describen los principales elementos que deberá contener, con el propósito de llevarse a la práctica y nos permita estar en posibilidad de interactuar con otros sistemas nacionales e internacionales de información en diversas regiones geográficas y que esto redunde en beneficio de nuestros usuarios.

El Panoroma Nacional de Mexico

El Sector Agrícola Nacional – México tiene una extensión territorial de 1,958,201 Km^2, equivalente a 195,820,000 hectareas, de las cuales son utilizadas para la actividad agrícola un promedio de 24,661,300 has., en cultivos; 74,499,000 has., para pastizales; y 5,166,300 has. en superficie de riego (AGRO-SINTESIS, 1991). Cuenta además con una población aproximada de 90 millones de habitantes, de los cuales el 33.6% es considerada como población agrícola (AGRO-SINTESIS, 1991) y donde el 80% de las familias rurales son minifundistas, que practican una agricultura tradicional[1], donde esta actividad se clasifica desde el punto de vista económico como una agricultura de subsistencia (Garcia, 1990).

En comparación con otros sectores económicamente productivos la agrícultura mexicana es relativamente pequeña, ya que tan solo aporta el 8% del Producto Interno Bruto (PIB), sin embargo constituye una de las áreas estratégicas para el desarrollo nacional.

Durante la década de los 80s el sector agrícola nacional al igual que el resto de los sectores productivos del país, se vió tremendamente golpeado por los efectos de la recesión económica. Esta situación comenzó a cambiar ligeramente a partir de los años 90s cuando el gobierno federal renegoció la deuda externa, logrando estabilizar la economía principalmente en lo referente a los procesos inflacionarios y política de paridad del peso mexicano frente al dolar americano.

Durante el sexenio 1988–1994, se ofrecieron apoyos significativos al campo a través del Programa Nacional de Solidaridad (PRONASOL) y del Programa de Apoyos Directos al Campo (PROCAMPO), lo cual trajo como consecuencia que en promedio 3.4 millones de campesinos obtuvieran subsidios para canalizarlos a la producción de granos básicos (maíz, frijol, arroz, trigo, ajonjolí, cártamo, soya, sorgo, cebada y semilla de algodón). Con ello se apoyó ampliamente a los grupos campesinos que menos tienen.

Recientemente hemos vuelto a vivir un problema similar al de los años 80s, debido a que en las últimas semanas de 1994, nuestra moneda nuevamente se devaluó. Esta situación nos conduce a trabajar de manera cooperativa, ya que es la única forma de continuar adelante.

La Educación e Investigación Agrícola – El 22 de febrero de 1854 se instituye la primera escuela de agricultura en México, debido a una necesidad histórica del país. Posteriormente en 1923 éste cambia su nombre adoptando el de Escuela Nacional de Agricultura (ENA). En 1978 debido a diversos cambios significativos en el contexto educativo nacional, la ENA se transforma en la Universidad Autónoma Chapingo (UACh), institución que desde hace varias décadas es el *Alma Matter* de los agrónomos mexicanos, así como la entidad que en los años 70s tenía las colecciones biblio-hemerográficas más importantes de América Latina.

Actualmente la infraestructura académica del sistema educativo en ciencias agrícolas de México, se integra por 173 escuelas vocacionales, 111 escuelas y universidades agrícolas, 31 escuelas de medicina veterinaria y zootecnia y 88 programas de posgrado ofrecidos por un conjunto de 25 instituciones de educación superior (POLANCO, 1992). Lo anterior comprende el sistema educativo en ciencias agrícolas más grande de América Latina.

Por otra parte la investigación agrícola se inicia en 1907, con la creación de la Estación Agrícola Central de la Secretaría de Fomento. En 1943, el gobierno méxicano,

solicitó a través de la Secretaría de Agricultura y Ganadería el apoyo de la Fundación Rockefeller y entre ambas entidades establecen la Oficina de Estudios Especiales.

En la década de los 50s, el gobierno federal ofreció un impulso sin precedentes a la agricultura, contando con un número considerable de profesionistas. En 1961 surge el Instituto Nacional de Investigaciones Agrícolas (INIA), como la entidad responsable de desarrollar las investigaciones para el campo mexicano.

Otras acciones trascendentales fueron el establecimiento en 1958 del Instituto Nacional de Investigaciones Forestales (INIF) y en 1962 la formación del Instituto Nacional de Investigaciones Pecuarias (INIP). Posteriormente en 1985, estas tres entidades por decreto presidencial se fusionan en el Instituto Nacional de Investigaciones Forestales y Agropecuarias (INIFAP), dependiente de la Secretaría de Agricultura y Recursos Hidráulicos (SARH). Con esta estructura el INIFAP estableció treinta y dos Centros de Investigaciones Forestales y Agropecuarias.

En 1992 el INIFAP tiene una nueva reestructuración, se divide en una vocalía ejecutiva y tres divisiones de investigación básica (agrícola, forestal y pecuaria), en ocho Centros de Investigación Regional y cinco Centros Nacionales de Investigación Disciplinaria.

En la producción de literatura técnico/científica del área agrícola nacional participan además de las instituciones anteriormente mencionadas otras entidades federales, estatales, privadas e internacionales, ello nos ha colocado en un importante lugar dentro del contexto latinoamericano.

Varios cientos de tomadores de decisiones así como público en general (funcionarios, empresarios, profesionistas, extensionistas, investigadores, profesores, alumnos, agricultores, campesinos y ejidatarios) requieren de esta información y la mayoría de las veces, no es posible localizarla debido a la falta de un organismo rector que facilite y permita el acceso a la misma.

El Sector de la Informacion Agrícola

Generalidades – En México la agricultura es la actividad que en mayor escala se practica y constituye después de los recursos no-renovables, una actividad de caracter prioritario para el gobierno federal, sin embargo los sistemas de información existentes atraviesan por una serie de problemas, situación que a lo largo de más de dos décadas se ha tornado complejo y sin una aparente solución.

Uno de los principales factores es la ausencia de un organismo rector que cuente con los recursos económicos, materiales técnicos y humanos; así como la infraestructura apropiada, dentro de un marco legal que le permita asumir el compromiso formal de compilar, analizar, procesar, almacenar, diseminar y transferir toda la información que anualmente se genera en este importante sector.

Esto ha traido como consecuencia que la información técnico/científica generada en las ciencias y la tecnología agrícola se encuentre dispersa, sin control, ni registro que permita su recuperación, consulta y transferencia.

Pocos han sido los esfuerzos realizados para conformar e integrar un organismo rector *ad hoc*, que permita solucionar lo que conlleva la carencia del mismo. Las causas son diversas destacando:

- Falta de concientización de parte de los funcionarios de alto nivel en relación a la importancia de constituir un sistema de información que permita que la misma se encuentre organizada, registrada y accesible para que pueda ser consultada por los usuarios.
- Falta de recursos financieros y humanos así como la ausencia de una planeación estratégica y políticas de acción desarrolladas para los servicios de información del sector agrícola.
- Falta de oportunidades y apoyo de las instituciones hacia los bibliotecarios y especialistas en información agrícola.

Generadores, Productores y Consumidores de Información Agrícola – En el sector de la información agrícola en México, estos tres elementos constituyen un ciclo que no puede omitirse. En el primero de los casos, se entiende por generadores de información a las personas e instituciones que preparan y desarrollan trabajos de investigación, reportes, tesis, programas estadísticos, etc., ello como resultado del esfuerzo intelectual. Por otra parte se consideran productores de información a las entidades del sector gubernamental y privado que hacen posible que un documento o serie de trabajos se publiquen y distribuyan para que los usuarios obtengan nuevos conocimientos; lo que permitirá que nuevamente se vuelva a generar información, cerrándose este círculo. En nuestro país los participantes en este proceso lo conforman las instituciones mencionadas en el inciso 1.2.

Colecciones Agrícolas Mexicanas – A continuación se describen brevemente las colecciones agrícolas mexicanas más importantes en relación con el número de volúmenes, ubicación y servicios y que son consideradas dentro del gremio bibliotecario nacional como las más relevantes por su acervo histórico.

INIFAP: Los centros de documentación cuando dependían individualmente de los institutos de investigación, contaban con presupuestos y tenían suscripciones a revistas y compra de libros en forma regular; después de los años 80s, comenzó en el país una situación generalizada de reducciones presupuestales en el gobierno federal y por espacio de diez años, todas las adquisiciones se cancelaron.

Al surgir el INIFAP, los centros de documentación y las bibliotecas de los centros experimentales continuaban con carencias y limitaciones en lo referente a su crecimiento. El número de bibliotecarios profesionales se redujo en forma considerable y comenzó a existir gran rotación de éste por personal profesional y no-profesional de otras áreas; ello debido al decremento de sueldos así como a la falta de oportunidades de desarrollo en esta institución.

En 1990 el Banco Mundial realizó para el INIFAP una consultoría para otorgar un crédito destinado exprofeso para investigación, tecnología e información, con el cual se logró la actualización de diversas suscripciones a publicaciones periódicas y bases de datos en discos compactos (CD-ROM). Este apoyo se terminará al finalizar el crédito. La ubicación física de las colecciones es: el centro de documentación agrícola se localiza en Celaya, Guanajuato, los centros de documentación pecuario y forestal se ubican en Coyoacán y Palo Alto, en la ciudad de México. Los servicios que ofrecen son: consulta, préstamo interno, externo e interbibliotecario, consulta y acceso a bases de datos en CD-ROM. Adicionalmente el INIFAP es el Centro Nacional Coordinador del Sistema Internacional para las Ciencias y la Tecnología Agrícolas (AGRIS).

Universidad Autónoma Chapingo (UACh): Las bibliotecas de la UACh, se localizan en Chapingo, Estado de México y apoyan las actividades de la Universidad. Prácticamente se puede decir que en el Estado de México, se localizan las tres colecciones más importantes; cuenta con trece bibliotecas departamentales y una central, posee gran cantidad de bibliotecarios profesionales. Actualmente la biblioteca central se encuentra automatizando algunas de sus actividades. Los principales servicios que proporciona son: consulta, préstamo interno, externo e interbibliotecario, búsquedas en bases de datos en CD-ROM; cuenta además con un número considerable de suscripciones vigentes.

Colegio de Posgraduados (CP): El Centro de Información y Documentación, se localiza en Montecillo, Estado de México y constituyen otro importante acervo biblio-hemerográfico, tiene diversas suscripciones vigentes a publicaciones periódicas y CD-ROMs, ofrece sevicios de consulta, préstamo interno, externo e interbibliotecario, acceso

a bases de datos en CD-ROM. Esta biblioteca básicamente constituye un gran apoyo a la investigación, la educación superior y de posgrado.

Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT): La biblioteca se localiza en el Batán, Estado de México y en conjunto con las bibliotecas anteriores constituyen la infraestructura en información agrícola más representativa de esa región. Esta posee bibliotecarios profesionales y no-profesionales. Tiene diversas suscripciones a revistas y CD-ROMs. Ofrece servicios de: consulta, préstamo interno, externo e interbibliotecario, consulta a bases de datos en línea y CD-ROM; así como el servicio de envío de documentos, además es centro regional de insumos AGRIS.

Facultad de Medicina Veterinaria y Zootecnia de la Universidad Nacional Autónoma de México (FMVZ-UNAM): La biblioteca, se localiza en el campus universitario de la ciudad de México, tiene bibliotecarios profesionales y no-profesionales. Regularmente adquiere obras monográficas y tiene suscripciones a un número considerable de revistas y CD-ROMs. Ofrece diversos servicios: préstamo interno, externo e interbibliotecario, consulta, acceso a bases de datos en CD-ROM. Cuenta con bibliotecas foraneas en diversas partes de la República Mexicana. Adicionalmente ha desarrollado el *Banco de Información en Veterinaria (BIVE)* y es el Centro Nacional Coordinador del Sistema Internacional de Investigaciones Agronómicas en Curso (CARIS).

Instituto de Biología y Jardín Botánico de la UNAM: Estas bibliotecas se localizan en ciudad Universitaria, ambas cuentan con suscripciones a publicaciones periódicas, bases de datos en CD-ROM y de forma regular adquieren libros. Tienen bibliotecarios profesionales y no-profesionales; además han desarrollado diversas colecciones en el interior del país. Proporcionan diversos servicios: préstamo interno, externo e interbibliotecario, consulta, acceso a bases de datos en CD-ROM.

En resumen estas son las colecciones documentales más representativas del sector agrícola mexicano y la mayor parte se localizan en la Zona Metropolitana de la Ciudad de México, por lo tanto un alto índice de los bibliotecarios técnicos y profesionales, se encuentran ubicados en el centro del país. Tomando en cuenta ésto, es necesario formar una red entre estas instituciones y trabajar a través de convenios interinstitucionales, que hoy constituyen la única fórmula para optimizar y compartir los recursos y servicios (ver Anexo 1).

La Cooperacion Interinstitucional

Antecedentes – Los primeros intentos de cooperación interinstitucional iniciaron con las reuniones de los responsables de las bibliotecas agrícolas a finales de los años 70s, hasta que en 1984 se conformó legalmente la Asociación Nacional de Bibliotecarios Agropecuarios, A.C. (ANBAGRO), así surgen los primeros compromisos de cooperación bibliotecaria interinstitucional, de igual forma se ofrecen los primeros cursos de AGRIS/CARIS y se participa en el desarrollo de catálogos colectivos y edición de publicaciones.

Uno de los objetivos principales de ANBAGRO es reunir al mayor número de agremiados en todo el país, con el propósito de realizar conjuntamente reuniones, trabajos de investigación, cursos, talleres de capacitación, ponencias, publicaciones entre otras; así como promoverla tanto a nivel nacional como internacional. Los participantes de aquellas reuniones eran bibliotecarios de: la UACh, CP, INIA, INIF, INIP, CIMMYT, Comisión Nacional de Fruticultura (CONAFRUT), la Biblioteca de Economía Agrícola de la SARH, la Facultad de Medicina Veterinaria y Zootecnia y el Instituto de Biología de la UNAM, desde entonces ANBAGRO es el pilar más importante del sector bibliotecario agrícola, por que a través de ésta se ha logrado conseguir mayor apoyo a las bibliotecas agropecuarias de cada institución.

ANBAGRO como Agente Catalizador – ANBAGRO se ha caracterizado por trabajar formalmente con instituciones como el Consejo Nacional de Ciencia y Tecnología (CONACYT), AGRIS/CARIS, CIMMYT y UACh, con el primer Comité Directivo de la Asociación se establecieron convenios para realizar los insumos para el *Catálogo Colectivo de Publicaciones Seriadas de la República Mexicana*, después con insumos para el AGRIS.

Se han organizado diversos cursos y talleres de capacitación para el personal bibliotecario. Se ha trabajado arduamente para preparar la *Lista de Publicaciones Adquiridas por Compra en Bibliotecas del Sector Agrícola Mexicano*, y la *Lista de Encabezamientos de Materia para Bibliotecas Agropecuarias*, estas publicaciones son el resultado de la colaboración interinstitucional y han reportado gran apoyo a los bibliotecarios.

Por otro lado cabe mencionar que ha sido muy importante la entusiasta colaboración de los agremiados ya que en ocasiones no ha habido necesidad de efectuar documentos o convenios formales para desarrollar los trabajos, sino que ha sido confiando en la "buena fe" y los "acuerdos verbales" de los socios, así las actividades asignadas a las instituciones han sido desarrolladas satisfactoriamente. Este mecanísmo sigue funcionando correctamente hasta la fecha, por lo anterior podemos señalar que *ANBAGRO es un Agente Catalizador* y ente principal del desarrollo bibliotecario agrícola nacional de los últimos años.

CIMMYT como Institución de Apoyo – El CIMMYT ha desempeñado un papel importante como soporte a las bibliotecas agrícolas, desde 1985 ha proporcionado diversos apoyos como son: impresión de publicaciones, cursos y reuniones para bibliotecarios profesionales y no-profesionales, pláticas de concientización para directivos, siempre

con el propósito de impulsar a las bibliotecas y bibliotecarios en favor de los servicios de información agrícola. Recientemente el evento académico más importante que ha organizado con el INIFAP y ANBA-GRO, fue el *Taller de Información Agrícola* en octubre de 1993, que logró reunir aproximadamente a 50 participantes del interior de la República Mexicana.

El Analisis de Sistemas y su Aplicacion al Modelo

Importancia (Elementos Principales) – El análisis de sistemas es una metodología científica que forma parte de la planeación y diseño de proyectos. Existen diversos tipos de sistemas y por sus características internas se clasifican en: unitarios, plurales, simples, complejos, estáticos, evolutivos, abiertos y cerrados; su objetivo principal es el estudio de la totalidad del sistema, crecimiento, diferenciación, orden jerárquico, dominio, control, interrelación, mecánica, evolución y finalidad (CURRAS, 1988). En los procesos del análisis de sistemas se deben considerar las siguientes etapas:

- Descripción: Presentación de hipótesis
- Verificación: Sometiendo a prueba las hipótesis, control de conceptos, observación de comportamientos, realización de experimentos
- Interpretación: Formulación de conceptos, conclusiones, normas y reglas

En la evaluación se pueden identificar el análisis estructural, funcional y relacional. En el primero se encuentran cada uno de los elementos unitarios del sistema y sus propias características y la estructura total del conjunto. En el segundo se estudian la operatividad de los componentes y en el tercero los factores de relación interna y externa con el medio. En el análisis de un sistema documental o bibliográfico es importante considerar los siguientes factores:

- Tipo de sistema
- Definición de objetivos

- Estructura
- Funciones
- Entornos
- Recursos existentes
- Utilización
- Objetivos nuevos
- Planificación a largo plazo
- Posibilidades de automatización

De acuerdo con ésto se plantea un modelo de caracter experimental, que considera los elementos antes citados con la finalidad de aprovechar la coyuntura nacional y la infraestructura de cooperación bibliotecaria interinstitucional que actualmente existe en la región central del país y posteriormente ampliar la cobertura.

Necesidad de Establecer un SNIA

Objetivos – Para el adecuado funcionamiento del SNIA se ha considerado que los objetivos del mismo se deberán formular de manera concreta, esto permitirá que los participantes en el Sistema identifiquen los mismos y así garantizar que las actividades se desarrollen y las metas se cumplan. Los objetivos concretos son:

- Desarrollar el SNIA, partiendo de la infraestructura de información que actualmente se dispone
- Desarrollar mecanismos de cooperación interinstitucional entre las diversas unidades de información agrícolas del país que permitan proveer servicios y productos de calidad a los usuarios
- Desarrollar ligas de acción entre las instituciones que tienen una infraestructura técnica, humana y documental y que deseen participar cooperativamente con otras instituciones nacionales para integrar una red
- Desarrollar diversos canales de comunicación formal con el propósito de asegurar e implementar el intercambio e interconexión de los servicios de información entre los diversos participantes en el SNIA
- Desarrollar lineamientos generales de cooperación entre las diversas instituciones con el propósito de

compartir conjuntamente las responsabilidades y beneficios
- Desarrollar la calendarización de las actividades que se deberán realizar, con el propósito de obtener los resultados en las fechas establecidas

Justificación del SNIA – Tomando como base todo lo descrito en este documento, consideramos que la situación de las bibliotecas, centros de documentación e información, requieren de la existencia de un organismo coordinador denominado: Sistema Nacional de Información Agrícola[2] (SNIA), que permita la integración para trabajar coordinadamente.

La justificación para desarrollar el SNIA, esta fundamentada en la filosofía de *Trabajar Cooperativamente para Compartir Recursos* y es el resultado del esfuerzo conjunto de un grupo de biblitecarios y especialistas en información que hemos venido desarrollando en equipo desde hace varios años dentro de ANBAGRO, con el firme propósito de mejorar, integrar y promover ampliamente los servicios que ofrecemos a nuestros usuarios.

Los bibliotecarios agrupados en ANBAGRO consideramos que el establecimiento del SNIA nos permitirá controlar, promover, difundir y transferir adecuada y oportunamente la información que anualmente cientos de mexicanos producen; asimismo estaremos en posibilidad de interactuar con otros sistemas nacionales e internacionales de información.

Propuesta de un Modelo para el SNIA

Conceptos – A continuación se describen los conceptos básicos analizados en este documento y se enuncian como son interpretados.

- *Modelo:* Constituye la representación gráfica así como la descripción detallada del entorno que se desea planificar.
- *Sistema*: Conjunto de diversas acciones y políticas interinstitucionales que permiten integrar y

distribuir cooperativamente compromisos y beneficios con el propósito de utilizar al máximo los recursos disponibles de cada uno de los participantes.

- *Red*: Integración de todas las unidades de información[3] que tienen características en común y al integrarse en un sistema adquieren compromisos interinstitucionales de caracter formal.

- SNIA: Conjunto de alternativas, políticas y acciones de cooperación interinstitucional para promover la creación y desarrollo de un organismo que permita controlar e integrar la producción bibliográfica nacional a través de las diversas unidades de información.

Formulación de una Política de Información Agrícola – En México no existe una política de información agrícola que coordine las actividades de las unidades de información de las instituciones gubernamentales, privadas y no-gubernamentales como en otros países. Sin embargo es conveniente que los bibliotecarios y especialistas en información agrícola, desarrollemos una propuesta que pueda ser presentada a las autoridades de la SARH, de tal forma que permita garantizar el establecimiento y permanencia del SNIA.

Para una adecuada formulación es necesario analizar en primer término los siguientes aspectos: educativo, económico, político, administrativo y profesional, con el propósito de garantizar la factibilidad de discutirse y aprobarse por el Poder Legislativo. La formulación de esta política deberá comprender:

- Desarrollo de recursos y servicios de información
- Acceso y difusión efectiva de la información
- Promoción sobre el uso adecuado de la información
- Desarrollo y coordinación de la información
- Capacitación de los usuarios

Requerimientos de la Institución Coordinadora – Para garantizar el adecuado funcionamiento de la red es recomendable que la institución coordinadora disponga de los siguientes componentes:

- Tener suficientes recursos humanos, técnicos y profesionales
- Recibir anualmente un presupuesto sólido para mantener actualizadas constantemente sus colecciones
- Disponer de un acervo documental básico
- Tener instalaciones que permitan atender al mayor número de usuarios
- Utilizar ampliamente las innovaciones tecnológicas que permitan el acceso a la información que se genera en otras regiones
- Mantener estrecha comunicación con diversas instituciones nacionales e internacionales
- Depender de alguna institución del gobierno federal
- Tener un sólido y reconocido prestigio nacional e internacional

Identificación de las Unidades de Información – El primer paso consistirá en ubicar las unidades de información agrícola, para ello es necesario identificar las diversas fuentes de consulta existentes en el país como directorios gubernamentales, directorios de productores agrícolas, ganaderos, directorios de asociaciones en diferentes ramas o sectores de la agricultura, directorios de universidades, facultades y escuelas de agronomía y de esta manera formarse una visión que permita saber cuales, cuantas son y donde se localizan.

Análisis de las Unidades de Información – Despues de ubicar físicamente las unidades de información, se procederá a realizar un censo sobre los recursos financieros, materiales, humanos y documentales con que cuenta cada institución; para ello se requerirá aplicar un cuestionario breve y conciso, con la finalidad que sea contestado sin dificultad por los responsables de las unidades de información. Se deberá tener cuidado para identificar donde se podrá aplicar el mismo y donde se necesitará realizar una visita y entrevista directa.

Es recomendable en caso de que las unidades de información se encuentren fuera de la ciudad de México, realizar el censo vía fax o en caso necesario hacer llamadas telefónicas o utilizar los servicios de mensajería especializada así como el correo electrónico. Estas serán las formas más viables para obtener el inventario de los recursos de información del sector agrícola nacional.

Las unidades de información que deseen participar deberán contar con requerimientos mínimos indispensables para funcionar en red:

Tener un bibliotecario profesionales o un especialista en información con estudios de licenciatura, maestría o grado de doctor o que tengan una experiencia mínima de cinco años en este sector trabajando en bibliotecas, con experiencia en el manejo de software y 90% de inglés

- Suscripciones vigentes a publicaciones (acervo base)
- Fotocopiadora
- Modem
- Fax
- Computadora
- Impresora

Evaluación de los Recursos y Servicios de las Unidades de Información – La finalidad de evaluar los recursos y servicios de información en las unidades es identificar aquellas instituciones o empresas que están en posibilidad de prestar un servicio al pertener a una red de información. Los puntos claves a considerar para la evaluación son los recursos humanos principalmente, posteriormente los recursos documentales y servicios con que cuentan; ya que si no tienen el personal suficiente para ofrecer un servicio a nivel de cooperación dificilmente podrán integrarse a la red.

Por otra parte si los recursos documentales no se encuentran actualizados, tampoco podrán participar, los servicios estarán dados en función de lo anteriormente citado.

Implementación de Convenios de Colaboración Interinstitucional – El convenio interinstitucional se

concibe como un mecanismo de cooperación mediante la firma de acuerdos institucionales entre las unidades cooperantes para la constitución del SNIA, el cual deberá estar dentro de un marco legal.

Esta responsabilidad recaerá en la institución gubernamental con mayor personalidad jurídica y tenga liderazgo entre los participantes.

Los acuerdos podrán tener una validez máxima de cinco años y se pueden renovar si las unidades cooperantes lo consideren pertinente. Un punto importante a incluir además de la organización es el funcionamiento y obtención de fondos, para ello es conveniente tener identificadas a las instituciones que generalmente otorgan financiamiento.

Creación de la Red – La creación de la red del SNIA conllevará el uso de una estructura de cooperación interinstitucional, además de utilizar la infraestructura tecnológica que hasta la fecha se conocen, así como aquellas que en el futuro se desarrollen y se den a conocer.

Existen diversos tipos de redes, entre las que destacan las siguientes: coordinada simple o de estrella, no-coordinada o en malla, conglomerada o compuesta y distribuida. Al analizar detalladamente cada una de ellas, consideramos que de acuerdo al enfoque que se le dará a las actividades que se pretenden desarrollar, la más adecuada es la red distribuida, porque este tipo de red permite que exista la conexión de todos los elementos, siempre a través del camino más corto y sin pasar necesariamente por ningún nodo central o cordinador (VOUTS-SAS, 1989).

Normatividad – Deberán existir lineamientos y políticas claramente establecidas para el organismo rector o coordinador de la red que permita estandarizar las actividades y mecanismos de intercambio de cada una de las partes del sistema y van desde las instituciones participantes, unidades de información, especialistas y usuarios; además tendrán que considerarse la tecnología y las te-

lecomunicaciones para realizar la transferencia de información. Es necesario que todo se maneje por escrito en documentos, cartas, oficios, memoranda, programas o manuales.

Actividades – A continuación se citan algunas de las actividades más relevantes que estarán a cargo de la institución coordinadora y las unidades cooperantes de la red.
- Reunir la mayor cantidad de material bibliográfico agrícola
- Adquirir los materiales bibliográficos requeridos sobre el área agrícola
- Organizar y procesar toda la información sobre el sector agrícola recibida en cada unidad cooperante para facilitar su ubicación
- Desarrollar una metodología de trabajo que permita normalizar las funciones y servicios de las unidades cooperantes del sistema
- Proveer la información agrícola que requieran las unidades cooperantes
- Promover los programas de capacitación y perfeccionamiento en servicios de los recursos humanos (en el país y el extranjero)
- Proporcionar asesoría técnica a los nuevos centros cooperantes. Evaluación y reorganización de los ya existentes
- Elaborar programas de capacitación para usuarios en el manejo de las diversas fuentes de información agrícola
- Desarrollar los manuales necesarios para la estandarización de equipo, formatos de intercambio y transmisión de información de todo el sistema
- Proporcionar la fotoreproducción a los usuarios de la red
- Crear y actualizar las bases de datos que se implementan en el sistema
- Desarrollar los instrumentos de evaluación de la red

Servicios – Existe una gama inmensa de servicios de información que deberán proporcionarse sin embargo la siguiente lista contempla aquellos que son prioritarios:
- Alerta

- Servicios de reprografía (fotocopias y microformatos)
- Preparación de listados de nuevas publicaciones
- Acceso a bases de datos nacionales e internacionales
- Recuperación y envío de documentos
- Diseminación selectiva de información
- Asesoría técnica para intermediarios y usuarios finales:
  —Desarrollo de bases de datos (con Micro CDS/ISIS)
  —Capacitación para el manejo de fuentes de información
  —Desarrollo de servicios de información
  —Desarrollo y manejo de unidades de información
  —Transferencia de información

Subproductos finales: A continuación se mencionan algunos ejemplos de los subproductos que se pueden obtener de estos servicios:
- Diseminación de servicios de información a los nodos
- Edición de catálogos colectivos
- Edición de CD-ROMs
- Intercambio de bases de datos

Usuarios – Es la parte fundamental y a quien se dirige todo el esfuerzo de construir una red, lo usuarios son principalmente los campesinos, agricultores, estudiantes, profesores, extensionistas, investigadores, empresarios, tomadores de decisiones quienes podrán satisfacer sus requerimientos de información dentro de sus respectivas áreas de trabajo.

Fases de aplicación – Después de haber efectuado las actividades previas a la creación de la red, se deberá iniciar con la primera fase de prueba entre las unidades de información, con la finalidad de verificar la operatividad y funcionalidad con objeto de aplicar las medidas correctivas y pasar a la segunda fase, misma que deberá asumir nuevas actividades, responsabilidades, nuevos integrantes nacionales y en una tercera fase la red trabajará a toda su capacidad. Esto le permitirá interactuar con otros sistemas nacionales e

internacionales. El tiempo de aplicación de las dos primeras fases podrá ser de un año respectivamente y la tercera de un período de dos a tres años, susceptible de modificarse de acuerdo a las necesidades de las unidades cooperantes.

Conclusiones y Recomendacions

La reciente crisis económica presentada en México y que ahora es más severa que las anteriores, nos da la pauta para actuar y tomar ya una desición definitiva e iniciar el proyecto *Sistema Nacional de Información Agrícola*, el cual reportará mayores beneficios si todas las instituciones involucradas: gubernamentales y privadas deciden comenzar una línea de acción y poner en práctica algunos de los conceptos y elementos de la planeación de proyectos que ya se han citado como metodología básica para el desarrollo de un documento final incorporando también las experiencias particulares de los participantes y presentar algo concreto a las autoridades competentes.

Esto creará mayor conciencia a las instituciones en el manejo de información que deberá darse de manera planificada y coordinada. Un componente fundamental para que esto inicie satisfactoriamente es la cooperación interinstitucional, mediante acuerdos formales de trabajo.

Es claro que en Méxio existe una amplia cooperación bibliotecaria interinstitucional y que cuentan con una infraestructura en el sector de la información agrícola y esta representada por los agremiados a ANBAGRO lo que da la pauta de tomar una desición inmediata para elabor un documento formal que permita verter la ideas y conocimientos necesarios para desarrollar el *Sistema Nacional de Información Agrícola* valiéndose de la metodología del análisis de sistemas que es el fundamental de la planeación de proyectos.

Es necesario crear las condiciones y ambiente necesario para desarrollar el Sistema que estará a cargo de todos los involucrados en las actividades de información agrícola para lograr un sólido avance que redunde en beneficio de los usuarios y a su vez en el panorama económico nacional.

NOTES

1. La agricultura tradicional la practica el campesino que puede caracterizarse como pequeño agricultor asentado en explotaciones, sea como propietario, arrendatario, aparcero, colono, cupante precario, comunero o ejidatario y que cuenta con características económicas sociales y culturales específicas, entre las que destacan: ejecuta actividades agrícoles con doble función productora/consumidora; utiliza intensivamente la mano de obra familiar y limitado uso de capital; y produce principalmente para autoconsumo, con rangos variables orientados hacia el mercado.

2. El término agrícola debe entenderse en el más amplio sentido de la palabra; comprende todas las áreas que abarca como son: ciencia y producción vegetal, biotecnología, ciencias del suelo, forestales, agrícolas y acuáticas, entomología, fertilización, medicina veterinaria, ingeniería agrícola, alimentación y nutrición, economía agrícola, sociología y desarrollo rural, contaminación y medico ambiente, technología postcosecha, administración agrícola, legislación agrícola, información y documentación, enseñanza y extensión agrarias.

3. El término unidades de información incluye: bibliotecas, centros de de documentación, centros de información.

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Mexico
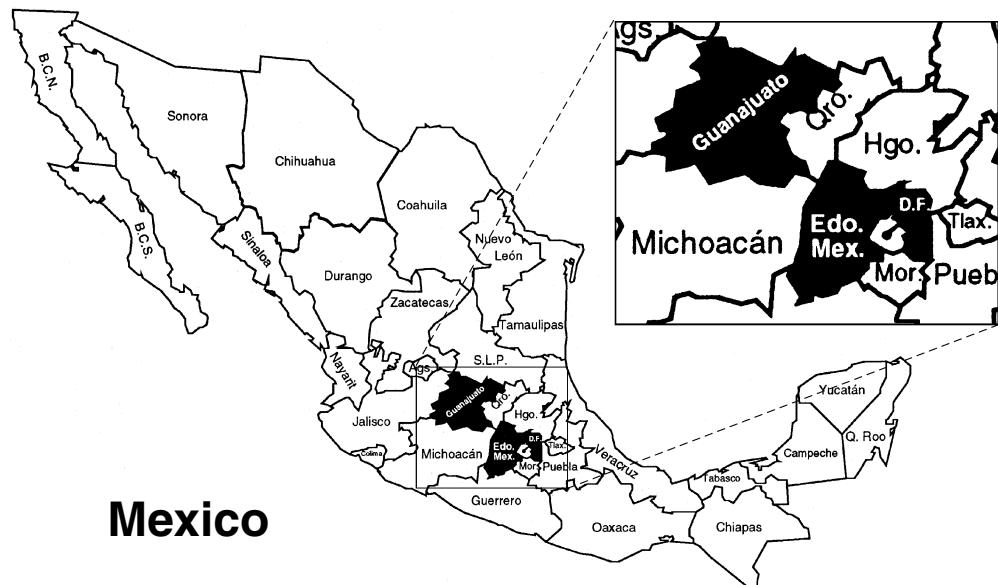
- Centro de Documentación Agrícola **(Guanajuato)**
- Centro de Documentación Forestal **(D.F.)**
- Centro de Documentación Pecuaria **(D.F.)**
- Biblioteca de la Facultad de Medicina Veterinaria y Zootecnia **(D.F.)**
- Biblioteca del Instituto de Biología **(D.F.)**
- Biblioteca del Jardin Botánico **(D.F.)**
- Biblioteca del CIMMYT **(Edo. de México)**
- Biblioteca de la UACH **(Edo. de México)**
- Biblioteca del Colegio de Posgraduados **(Edo. de México)**

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ANEXO 2 – RED DISTRIBUIDA
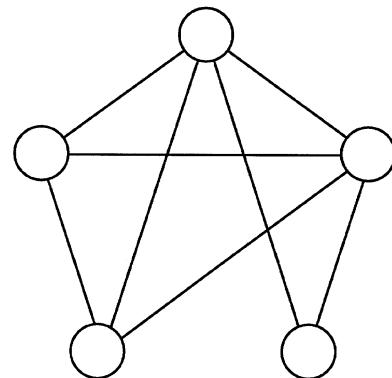
MIGUEL A. LÓPEZ-PÉREZ is employed by Centro de Información y Documentación Nuclear (ININ) and Lic. Leticia Roseta-Vela is with McKinsey and Company in Mexico.

CONTACT ADDRESS:

Mtro. Miguel A. López-Pérez
Centro de Información y Documentación Nuclear
Apdo. Postal 18-1027
México, D.F.
MEXICO

Concurrent Session 3

Opportunities and Challenges for Extension in Rural Areas:

Experience from the Mukono District (Uganda) with the Training and Visit Extension Model

Emmy Beraho, Basil Sheahan, and Tim Reeves

ABSTRACT: This paper discusses aspects of rural extension from the perspective of experience gained in working with rural communities in Uganda between 1989 and 1992, insight into the operation of landcare groups in Australia in 1993, as well as observations and a survey recently carried out in the Mukono district during 1994. An argument is presented that more than an appropriate communication technique (extension model) is needed for meaningful utilisation of extension messages in rural areas. The paper highlights strengths and weaknesses in the current extension system based on the Training and Visit (T&V) model, points out challenges an extension agency has to face in rural change, identifies opportunities available to enhance change, and presents a model that could be adopted to improve service delivery to rural areas. This model is based on the Ministry of Agriculture utilising a local non-governmental organisation (NGO) linked to farmers groups. The extension system is comprised of three main subsystems: farmers' subsystem, NGO subsystem and Ministry of Agriculture subsystem, linked in such a way that each subsystem does what it can do best in enhancing communication and utilisation of agricultural information in rural places. A need for developing and strengthening grassroot institutions, in order to develop a local capacity to sustain development and break the dependency syndrome is highlighted.

RESUMÉ: Cet article analyse les expériences de vulgarisation agricole des communautés rurales d'Ouganda entre 1989 et 1992, avant de donner un aperçu des opérations des groupes Landcare en Australie en 1993, ainsi que les résultats d'une étude réalisée dans le district de Mukono en 1994. L'hypothèse de base est qu'il faut des techniques de communication appropriées pour faire passer des messages significatifs en monde rural. Le document met en exergue les forces et les faiblesses du modèle Formation et Visite (T&V), indique les défis des agences de vulgarisation face à un monde rural en pleine mutation, et suggère un modèle qui pourrait être adapté pour améliorer les services fournis au monde rural. Ce modèle est basé sur l'expérience du ministère de l'Agriculture de l'Ouganda qui utilise une organisation non-gouvernementale (ONG) locale liée aux groupes de producteurs. Le système de vulgarisation est constitué de trois sous-systèmes : le sous système des producteurs ruraux, des ONG et du Ministère de l'Agriculture. Ce système est structuré de sorte que chaque acteurs ne réalise que des actions pour lesquelles il a un avantage sur les autres acteurs pour renforcer la communication et l'utilisation de l'information agricole en milieu rural. Enfin, le document met en évidence la nécessité de renforcer les institutions à la base afin de développer une capacité locale susceptible de soutenir durablement le développement.

RESUMEN: Este documento trata aspectos de la extensión rural, desde la perspectiva de experiencias de trabajo con comunidades rurales en Uganda entre 1989 y 1992, apreciaciones del funcionamiento de grupos conservacionistas en Australia en 1993, y observaciones y una encuesta realizadas en 1994 en el Distrito Mukono. Se presenta el argumento de que se necesita más de una técnica de comunicación (modelo de extensión) apropiada para que el uso de los mensajes de extensión en zonas rurales sea significativa. El trabajo destaca las fortalezas y las debilidades del actual sistema de extensión, con base en el modelo de Capacitación y Visita (C&V). Se señalan los retos que una entidad de extensión debe enfrentar en el proceso de cambio rural, se identifican las oportunidades disponibles para acelerar ese proceso de cambio, y se presenta un modelo que se podría adoptar para mejorar la difusión de servicios en zonas rurales. En el modelo, el Ministerio de Agricultura se apoya en una organización no gubernamental (ONG) local que esté vinculada a los grupos de agricultores. El sistema de extensión consiste en tres subsistemas principales: el de los agricultores, el de las ONGs y el del Ministerio de Agricultura. Los subsistemas están vinculados de tal forma que cada uno aporta según sus capacidades en pro del mejoramiento de la comunicación y el uso de la información agrícola en las áreas rurales. Es evidente la necesidad de desarrollar y fortalecer las instituciones en comunidades rurales, a fin de éstas adquieran una capacidad local que les permita mantener el desarrollo y romper el síndrome de dependencia.

Uganda is located in East Central Africa, neighboured by Sudan on the north, Zaire on the west, Rwanda and Tanzania on the south and Kenya on the east. It has a population of about 17.6 million (1990 census). Agriculture is the mainstay of Uganda's economy; it contributes abut 65% of Uganda's Gross Domestic Product and absorbs about 70% of the national labour force. Most farmers practise mixed farming. Mukono district, located in the central region, is one of the 38 districts of Uganda.

There have been three stages in the development of agricultural extension services in Uganda to date. The first was a regulatory system where the extension agents helped chiefs to enforce by-laws relating to agriculture (advisory and police role). Next came an agricultural education approach where extension agents prescribed necessary practices to farmers on an ad hoc basis, through four parallel extension services; agriculture (crops), animal husbandry, fisheries and tsetse control. The present day unified extension service is based on the Training and Visit (T&V) model of extension, where the front-line worker is expected to advise the farmer on all major farm management practices. This approach looks at a farm as a system, as practised by the subsistence farmer who grows some crops and keeps a few animals. Unified extension helps those farmers wishing to diversify their activities for the sake of balancing their diet, and/or undertaking small scale income generating activities. This enables the farmer to gain the information needed from one person, a 'one stop shop'.

Methodology

A study was carried out in the Mukono district of Uganda to investigate the strengths and weaknesses of the T&V model in practise. Extension staff working with the Agricultural Extension Project (AEP) in the district were surveyed. One hundred farmers in the project area and 26 from a non-project area were interviewed. Participant observation and secondary data were additional valuable sources of information.

T&V Model of Extension— a Definition

T&V is an extension model whose main objectives are to improve the delivery of extension services, the quality of extension messages and the management of extension services in rural areas. Initiated by

Daniel Benor, it was first tried in Turkey in the 1960's, adopted as a national extension system in India in the 1970's and also tried in a number of other Asian countries at about the same time. Kenya was the first African country to try T&V, and a number of other African countries have tried it since (Bindlish and Evenson 1993). It was first adopted in some parts of Uganda in 1992. It is an extension system widely promoted by the World Bank.

According to Benor and Harrison (1977), the principles on which the T&V model is based are:

- a unified extension service emphasising a single line of command from the government agency responsible for agriculture to the field-level extension worker;
- extension personnel who devote all their time to extension work, with no other job assignments;
- a systematic time bound program of training and visits for both extension agents and farmers;
- concentration of extension efforts on agricultural extension rather than spreading the effort over a wide range of other activities;
- extension agents who begin with an activity that leads to an immediate impact to establish credibility;
- use of contact farmer strategy;
- emphasis on use of locally available resources;
- recommendations made according to the ability of the farmer;
- emphasis on extension–research linkage;
- an in-built process to adjust to changing circumstances.

An Overview of T&V in Uganda—Including Results from the Survey

Achievements in Uganda – T&V has so far been successful in achieving some of its objectives in Uganda. Farmer-extension contact (with respect to the number of farmers now reporting regular visits by extension agents) has increased. The

mobilisation of farmers has been impressive. This is reflected in the rate of group formation. So far, 543 groups have been formed in the Mukono District alone (men's 78; women's 152; youth 66; mixed 244). This has been achieved within 8 months of introduction of the AEP. The average size of a group is 25 people. It is interesting to note the high involvement of women.

The promotion of use of available resources and local knowledge has been of interest. The survey found that cultural methods of agricultural production comprise key extension messages. For example cultural methods of controlling notorious banana weevil are promoted in preference to conventional chemical treatment, hence saving a lot of money in addition to being environmentally friendly; cultural methods of grain storage are emphasised; and cow shelters for zero-grazed animals are constructed using locally available materials.

Attitudinal changes on the side of extension agents with respect to the fact that they now have a better understanding of their clients, and that they acknowledge that they do learn from farmers was observed. For example most extension agents cited the above cultural techniques as examples of what they have learnt from farmers. Regular and scheduled training of extension staff is now practised, thus keeping extension agents abreast with new developments as well as refreshing their knowledge. Through networking of the departments that used to run parallel extension services, but serving the same farmer, optimisation of resource use has been improved. As a result of these improvements, immediate benefits were registered both among farmers and extension staff.

Weaknesses in Uganda – T&V has been reported to have had a positive impact in some parts of the world particularly in India (Roberts, 1989). Evaluations done and observations made in a variety of areas both during and after the implemen-

tation of T&V, report that it has not had a significant impact in contributing to rural development. Table 1, synthesised from Antholt (1994) and Seilenga (1993), throws light on this issue.

The question worth asking at this stage is whether T&V's achievements are based on a sound premise that will underpin the community's capacity to sustain the achievements and the associated activities, or will these achievements 'evaporate' as soon as the official project time, and therefore externally propelled development, expires? To understand this it is worth identifying weaknesses inherent within the T&V system.

Narrow focus: T&V focuses on provision of farming information and ignores other essentials necessary to enable farmers to utilise the information. These essentials include: availability of credit, markets for selling farm products and production inputs. Lack of these essentials limit rural development because, for the agricultural information to be usable, their availability is essential. Without them the 'pile' of information a farmer receives from extension agents may contribute to his anxiety, disillusionment and apathy, in addition to eroding the credibility the extension agents could have already established with the farmer. This situation can already be observed in the T&V area of Ugan-

Table 2 – Problems Identified by Farmers as Limiting Their Progress

Problem	Frequency
Lack of inputs	65
Pests and diseases	27
Poor soils	16
Scarcity of land	17
Marketing problem	14
Labour shortages	3
Water shortage and drought	18
Inadequate extension services	6
Transport	14

da. For example an extension message that aims at controlling tick borne diseases through an improved tick management program, may put emphasis on proper spraying with the right acaricide. Unless the farmer can afford the acaricide, that piece of information will be unusable by that farmer. It is this narrow approach, of overly concentrating on provision of farming information, with total disregard of other requisites for utilising the information that makes the T&V system unable to sustain farmers morale. It also makes it less participatory because it comes with a predetermined problem (lack of sufficient farming information) and a predetermined solution (provision of the information). No effort is directed at diagnosing farming problems in totality with the farmers, and then jointly developing a possible solution. Farmers participate in identifying their farming information needs only; but this is not sufficient, as it limits the scope of participation. Table 2 lists the problems identified by farmers as limiting their progress.

T&V focusing purely on provision of farm management information, when a large number of farmers report that they are limited by a range of other problems, shows that farmers do not genuinely participate in identification of their farming needs. It also questions the usability of the farming information when a host of constraints to implementing the information are barely addressed. In effect T&V helps in making farmers aware of the farming infor-

Table 1 – Country and Provincial Impact of T&V

Country	Comment
Pakistan —	No impact, focused too much on process and little on increasing the relevance of technology messages and different methods of transferring them.
Indonesia —	No impact in non-rice, dry-land, mult-sytem crops.
India	Andra Pradesh — No effect in rain fed well-endowed areas
	Haryan (under T&V) and Punjab (without T&V) — No difference observed in their relative growth of wheat and agricultural gross domestic product.
	West Bengal, Bihar, Karala, Maharashtra and Tamil Nadu — No causal connection between incremental productivity and incremental investment in the T&V system
Thailand —	Moved to a "participatory farmer planning" approach after trying T&V for 5 years. Rice yields increased by 1 to 1.7% per year in the 10 years since introduction of T&V. Crop diversification and cropping intensity also increased. But these changes could not be reliably linked to investment in the system.
Terai of Nepal —	After 10 years had no impact on wheat yields.
Bangladesh —	No effect on changing "orientation of extension to clients", a major objective for introducing it.
Malaysia —	In 1984, decided T&V was not a workable model and changed to a market-driven commercial approach linked to groups.
Kenya —	Rated poor, no sustained impact on farmers and increase in production minimal
Zambia —	Rated poor, achieved little relative to its objectives.
Cameroon —	Rated poor, managerial and organisational difficulties led to complete lack of interest by farmers.
Niger —	Rated poor , expensive to run and had a high farmer desertion

adapted from Antholt (1994) and Seilenga (1993)

mation (awareness stage in the adoption process) but does not go far enough to assist in the entire adoption process.

Management problem: T&V puts emphasis on improving the management of extension activities at the field level. The entire extension management structure, in which field extension staff operate, is virtually left unchanged. As a result, the supervision of field extension agents improve, but nothing is done to mitigate the irrationally bureaucratic, prescriptive, patronising and top-down management approach practised by managers of government extension agencies, whose inefficiencies are eventually reflected at the field level, and blamed on the field extension agents.

Lack of local farmers' institutions: no emphasis is put on developing grassroot institutions, which in turn would be a basis for establishing a self-help capacity necessary to sustain the achievements and development activities (groups are used merely as extension contact entities). For development to be meaningful and sustainable it must come essentially from the people that are a subject of change. External support is only necessary as a catalyst to facilitate the development process. In other words, development cannot be donated from an external 'big brother' it is essentially an internal process by the local people themselves. This is why it is crucial that a strategy to involve people, through genuine participation, should be on top of a development agenda of an intervening body in order to break the dependence syndrome—a pathology that is a hindrance to sustainable rural development.

Need for Extension to Provide Essential Production Factors – A number of essential production factors (as mentioned above) are needed in an agricultural production process and these factors are interdependent. Absence of any of them may render the others unusable or lead to their inefficient use. In the tick control example above, the acaricide, and the information about its use and the reason for using it are important. The information about its usage when the farmer cannot obtain it is unusable. Availability of the acaricide without information about its usage, and reasons for using it may be equally useless.

Among resource poor farmers, operating at a subsistence level, farming information may be the first limiting production factor because at such a level, improvement can be obtained by using better management practices. But soon, for other practices to be applied, availability of another or other factor(s) of production will be vital. This is the interface where information and other factors start influencing each other.

T&V emphasises provision of farming information only. Extension agents are expected to inform the farmers where credit and other inputs can be obtained. But because the majority of extension clients are resource poor, largely illiterate, unorganised, operate at a subsistence level and are widely dispersed spatially, (to whom Roling, (1988) referred to as low access farmers), it would be unreasonable to just inform them of where the other factors of production could be obtained, given that formal institutions that provide such services are profit orientated, and therefore not attracted to this particular sector of clients. This makes the formal institutions unsuitable to serve this sector of the rural community meaningfully in its present organisation. It is because of this reality that extension should not only concentrate on enhancing one factor, with a hope that other agencies will come in and take care of the rest. An integrated approach that ensures the availability of all the essential production factors is therefore necessary.

Extension should take the responsibility to co-ordinate the provision of extension services as well as enhancing the opportunity of the farmers to access basic production resources. It is true that extension agencies face budgetary constraints and may not be able to directly meet material needs of farmers, but basic production requirements of resource poor farmers could be mobilised from within themselves through mobilisation and organisation of rural communities by forming and strengthening of grassroot institutions. These then become the basis for mobilising local savings which can be used to loan each other, and sometimes the savings matched by external supporters. The grassroot institutions can also be an effective way of linking rural communities to external formal institutions like banks. Braverman and Guasch (1989); Gabianu, Lycette and White (1989) USAID (1983) cited in Holt and Ribe (1991), respectively observed that resource poor farmers have a low default rate, are capable of saving, and can utilise unsubsidised credit. Organisation of farmers into groups or associations on a basis of mobilising savings from them or undertaking joint activities where a group has a comparative advantage over an individual in accomplishment is therefore required. These organised groups apart from having the capacity to mobilise savings amongst their members, can be strong local institutions that have an enhanced capacity to bargain with external institutions like banks and input suppliers.

Again, because external institutions are usually profit motivated, they are not suitable to undertake this organisational task. An extension agency handling this organisational task can be justified by the fact that agricultural extension agents are generally more widely distributed in rural areas than workers of other departments, and are in constant direct contact with farmers. Development of these grassroot institutions is also a strategy to enhance equitable utilisation of extension messages by rural farmers. Therefore the narrow focus of T&V together with the principle of beginning with an activity that will cause immediate positive impact, may lead

to early excitement and to disillusionment later, not only to farmers but to extension staff as well; thus being eventually counterproductive.

The limiting factors mentioned above, though they cannot be put in the order in which they limit progress as the extent and combination with which they limit farmers advancement in agriculture is situation specific, can be illustrated in a model below.

Take a hypothetical example of a multistage reaction

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$$F1\quad F2\quad F3$$
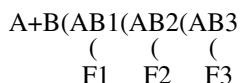
where A & B are inputs, AB1 and AB2 are intermediate products and AB3 the end product. F1, F2, F3, are factors necessary to facilitate the rate of formation of AB1, AB2, AB3, respectively, hence the rate at which inputs A & B are utilised to form end product AB3. Without inputs A & B there will be no product at all. If factor F1 is provided, but F2 and F3 are lacking the effect will be an accumulation of intermediate product AB1, but the rate of formation of AB3 (which is our target) can only slightly improve at best. If F3 is provided without F1 and F2, it will not be utilised. If all factors are provided, the rate of formation of AB3 is maximised. So, the rate at which AB3 is formed will depend on the availability of the facilitating factors.

This could be likened to extension. In the process of changing a society, there are necessary inputs; factors that facilitate the utilisation of the inputs such as knowledge and availability of markets; intermediate stages in the change process like awareness; and finally change which is the goal that is adoption of the innovation. So, like the above reaction which depends on fulfilment of necessary conditions, so does the change process in society. A range of factors are necessary for success, for example knowledge may facilitate the change process up to the awareness stage and production inputs complete the process up to adoption

of the extension message. Similar views can be found in a variety of literature: Mosher (1966) observed that for agriculture to get moving, there are certain essentials that must be available: markets, transportation, technology, supplies and production incentives for farmers and accelerators like education, credit, group action by farmers, improving and expanding agricultural land and national planning. Similar views are held by Roling (1988) he refers to them as a mix of essentials. Van den Ban and Hawkins (1990) observed that agricultural extension is essential but should be combined with proper farmers' problem census, credit, markets for products and supplies. Campbell (1992) was of the view that, for developing sustainable systems, certain conditions must be met to realise meaningful change. He states these as commitment, resources, knowledge and change process.

Challenges Facing Extension – Based on the weaknesses identified in the T & V system and the previous extension systems, it is clear that a number of challenges facing extension, which must be redressed so that clients are served equitably, and a local capacity to sustain development activities is established. They include:

Need to restructure the organisation of Uganda's extension agency: In order to be more relevant and responsive to rural farmers needs, there is a need to restructure the organisation of the Ugandan extension agency to ensure that, among other characteristics, it is appropriate, flexible, effective, efficient and free from excessive bureaucracy. The current organisation is excessively bureaucratic, lacks the necessary flexibility necessary to respond to rural problems, is patronising and essentially 'top-down'. This makes it unsuited for the responsibility of implementing extension programs in rural areas. A body, in between government and farmers, could be more efficient in implementing ex-

tension programs, organising farmers, and linking them to the government agency responsible for provision of the services. Such a body is likely to be more accountable to the end users of the service (the farmers) as well as to the policy makers (the government). Co-operation and commitment from the government is essential for this kind of arrangement. Under the current arrangement the government formulates agricultural policies, implements them and also evaluates them! This questions the capacity for self-correction. It could be more productive for the government to contract the delivery of extension services to another body and concentrate on strategic planning for rural agricultural development and also monitoring and evaluation of the contracted services to ensure that the contracted body does the right job and give accurate feedback.

Government suitability in directly implementing rural development related activities like extension is increasingly being questioned in the literature. For example Nayman (1988 cited in Antholt, 1994) found that "…the pattern of internal communication in the Department of Agriculture in Pakistan is asymmetric (gearing to control rather than to create an understanding) and top to bottom".

Uphoff (1984) stated that "…Within third world bureaucracies, there are many very capable people, highly motivated and serious, yet who operate within an administrative system that is disappointing in the results it achieves…such organisation amounts too often to less than the sum of its parts." He goes on to say that this results not so much from personal faults or defects as from the structural situation in which people find themselves. Fisher and Manwan, (1988); Drysdale and Shute, (1989). cited in Antholt, (1994), with reference to Indonesia, respectively stated that 'because of the limitations inherent in a centrally controlled and managed extension service, extension was unable

to deal effectively with the site-specific needs of farmers' problems and opportunities', and that the top down flow of information, which stems from national planning objectives, did not necessarily reflect the objectives of farmers'. Morris, (1988) and Antholt (1991), cited in Antholt, (1994), observed that "given the seasonality of work loads, the heterogeneity of agro-ecological systems, changing market conditions, and the difficulties of travel, extension services must be decentralised and made more flexible".

Roling (1988) advised that there is a need to change the targeting of existing agricultural information systems and service institutions, in order to generate claims of services from below. He suggested a tripartite extension structure, where another body charged with the responsibility of organising farmers and enhancing their ability to claim services from the extension agency becomes the intermediate body.

Need for grassroot organisations: Development of a social infrastructure in the form of local institutions like farmer groups, is probably the single most important legacy extension can have in rural areas; it is an investment for further and sustainable development, and essential if genuine participation by farmers is to be realised. As Freire (1976) observed, a person that is neither in dialogue nor participating, accommodates to conditions imposed upon him and thereby acquires an acritical frame of mind. The importance of this societal organisation not withstanding, it is the most neglected activity in rural development. Possibly because it is the most difficult stage in the development process and requires a lot of time and patience, but is nonetheless possible. A development process is not expected to be an easy exercise, as the problems faced are equally not easy. Avoiding this reality not only postpones the problem, but allows it to grow and possibly to become more intractable. The importance of organisation can not be emphasised

enough (see T&V weaknesses) no development can take place anywhere (urban or rural) at any level (micro or macro) without support institutions. This is recognised widely. For example the Pan African Congress conference that was held in Kampala (Uganda) in April 1994 recognised this in the theme "organise don't agonise". Simply enumerating problems or attempting to solve them in unorganised community with ill developed institutions may be a palliative measure at best. Lack of sufficient social organisation could be the single largest contributor to development stagnation in developing countries and rural areas in particular. The World Bank sociologist Cernia (1982) cited in Uphoff (1984), reporting his conversation with an economist who conducted a study of the agricultural sector of two developing countries, shares this view when he succinctly stated:

> He told me that in order to increase resource mobilisation, the two governments have used almost all the conventional economic remedies: they have attempted to raise various agricultural levies; they have expanded the commercial banking and credit network; they have subsidised certain inputs (e.g. fertilisers) so as to encourage their usage; they have invested in road infrastructure; and so on.
>
> But inspite of all these efforts, the agricultural economy has remained sluggish and obstinately refuses to develop at a steady rate. The only thing the governments have not paid attention to, my colleague commented sadly, was institution building in rural areas. They did not at all perceive the urgency of providing the peasants with more adequate social institutional structures for increased economic effectiveness, so that the farmers themselves could achieve a self-sustaining and durable growth.

Development of these institutions will require use of professional group dynamics skills, to support and fa-

cilitate the emergence and development of the groups. The Australian landcare groups provide a good example; human resource development is part of their program. Farmers and their leaders are equipped with leadership, management and necessary group dynamics skills enabling them to overcome problems that emerge in the process of group development. To achieve this, facilitators are attached to groups, to help develop them into viable and self-sustaining institutions. They are also reinforced by extension professionals who continually do research and provide them with necessary literature and a theoretical basis for the functioning of their groups.

Need to enhance research–extension linkages. In Uganda there has not been sufficient research activity to meet extension needs. Though this is not a limiting problem at the moment because there has been a substantial information backlog to get extension going. It is likely that it will be a limiting factor soon. The focus of research is also biased towards biological issues (such as getting high yielding, disease resistant varieties.), and little is done to come up with tools that will increase labour productivity. Research in this area is badly needed in developing countries, in order to increase labour productivity, and relieve farmers of unnecessary hard labour. Extension's role here is appropriate communication of research needs to researchers and trial of the research products to verify their appropriateness to the local situation.

Opportunities for Extension in Uganda

Uganda has relatively well trained but under-utilised staff for all levels of an extension organisation and sufficient support institutions of higher learning to sustain national staff development needs. Government recognises agriculture as the mainstay of its economy, therefore agriculture enjoys better funding within the limits of fiscal realities.

Staff are enthusiastic about work as long as the incentive structure meets their commitment and output. Uganda has a relatively favourable climate and a comparative advantage over her neighbours in agricultural productivity and production.

Farmers are enthusiastic about participating in rural development activities as indicated by the rate at which farmers formed groups in AEP area mentioned earlier. So, mobilising farmers into groups and associations is not likely to be an up-hill task since they already value them. Since commitment is an important input in the change process, this is a valuable opportunity for extension.

Many donor agencies now recognise the role NGOs play in rural development, and their potential to complement government efforts in the process of rural development is increasingly getting recognition. For example co-operation with a non governmental body in developing countries, which is involved in projects for assisting the poor and strengthen their self-help capacity, is used as a criteria by the German government to fund its NGOs undertaking development activities in developing countries (OECD, 1993).

Need for an Alternative Extension Management Approach – From the discussion so far, it can be inferred that government bureaucracies of developing countries are unsuitable for directly implementing development activities in rural areas. Lack of flexibility in their operation, a top-down communication approach, inefficient use of available and scarce resources renders them unsuitable candidates for implementing rural development activities like extension. Therefore there is a need to demystify the irrational view that only government bodies can deliver services in rural areas, even where alternative agencies that have been tested in the field and proven to be superior to governments are available. These agencies however need the support and commitment from the government, since the latter controls resources and makes laws that determine the suitability of the former's working environment.

The Extension Triad: An Alternative Approach to Direct Government Involvement in Extension – This considers the agricultural management system as being composed of three subsystems: The government subsystem; the NGO subsystem (which is an intermediate body linking the government subsystem and farmers subsystem) and the farmers' group subsystem. These systems together form an 'extension triad'. depending on how they are made to interact, the outcome is expected to have a synergistic effect. Each subsystem does what it can do best to achieve the synergy. The view of establishing an autonomous intermediate body in the extension system is shared by many authors for example Roling, (1988); Uphoff, (1984) and (OECD, 1988).

Objectives of This Approach – This approach is not a radical change in extension system, from the government implemented extension services to an intermediate body, in this case an NGO. It is just a change of approach to make the government more efficient in executing its responsibility of provision of services to rural areas. The basic aim is to ensure that the agency that interacts directly with the farmers has, inter alia, the following futures: flexibility, effectiveness, efficiency, freedom from government bureaucracy, and the assurance of genuine participation of farmers.

Role and features of the government subsystem includes:

• Formulates strategic agricultural development policies together with the other subsystems.

• Should not directly implement extension activities, but contracts a local NGO to implement them and provides it with general operating guidelines.

• Conducts routine and vigorous monitoring and evaluation of the contracted NGO to ensure that the end users of the service are well served according to expectation and that resources are well utilised.

• Retains the Headquarters staff and a few district level staff to liaise with the NGO and the farmers.

• Funds the NGO and external support for agricultural development activities should be channelled through the NGO even if the government negotiates it.

Features and role of the NGO subsystem includes:

• Implements field activities.

• Links with researchers.

• Accountable to the government and the farmers.

• Inherits the field staff to take advantage of their experience and skills.

• Utilises the good attributes of T&V.

• Monitors and evaluates its programs for its internal management needs and those of stake holders (farmers, government and so forth).

• Local institution development should be a priority.

• It should be an autonomous body free of government bureaucracy interference

• Must be an indigenous organisation.

• Through its national secretariat, should try to raise funds locally and/or externally to augment government funds.

• Should also network with other NGOs in the area like the church to maximise use of resources available for rural development and ensure that their activities are co-ordinated.

Farmers' group subsystem works closely with NGO and provides information to government and NGO during routine evaluations of the performance of the NGO.

Advantages of an NGO approach include are that: the bureaucracy within the Ministry of Agriculture is by-passed; more efficient and effec-

tive use of resources since they are now deployed from headquarters to the field. Time wasting is reduced and existing staff are maximally utilised. Funds budgeted annually for agriculture, and from donors now go directly to where they are needed and serve people in whose name they are acquired. Farmers find it easier to ask for services from NGO than from the government since they are nearer them and more flexible. For example Ritchie.D (1994) noted that "many farmers never will take advantage of government extension services, but may be served by expanding NGO extension systems". There is a decrease in senior managers' interference with field staff. Extension coverage area can be wider. NGO's have a history of reaching remote areas. Government workers tend to concentrate in cities and towns hence urbanising extension.

Conclusion

The T&V approach to extension is an improvement to the previous extension system in Uganda. The T&V focus on provision of farming information is essential but not adequate to attain sustainable rural development. Strategies to enable farmers to make use of the information are required. There is a need to restructure the organisation of an extension agency to ensure that the body responsible for implementing extension field activities is: effective, efficient, autonomous and free from government bureaucracy. The government bureaucracy should retain the supervisory role and general strategic planning, and contract the execution of day-to-day field extension services to an autonomous intermediate body. Extension should not be overly concerned with the

process—communication of agricultural information to farmers, and lose sight of the end—sustainable rural development. To attain sustainable rural development, it will be necessary for extension agencies to engage in a deliberate development and strengthening of grassroot institutions and make genuine local participation of farmers in development activities both a means and a goal of sustainable development. Development and strengthening of indigenous NGOs should be encouraged.

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EMMY BERAHO, BASIL SHEAHAN, and TIM REEVES are with the Department of Agronomy and Farming Systems, University of Adelaide, Roseworthy Campus.

CONTACT ADDRESS:

Emmy Beraho
Department of Agronomy and Farming Systems
University of Adelaide—Roseworthy Campus
Roseworthy SA 5371
AUSTRALIA
E-Mail: eeberaho
@roseworthy.adelaide.edu.au

Equity for the Information Poor: Marketing Information for Asian Farmers in Remote Areas

Jan Bay-Petersen

ABSTRACT: Marketing for small-scale farms in Asia is discussed as an example of how difficult it is to provide regular, timely and relevant information to geographically remote users. Most countries in Asia attempt to provide some kind of marketing information service to help farmers decide what to produce, where and when to sell, and what price to expect. Some of these are expensive electronic information systems. Recent studies show that these are useful to central government agencies rather than farmers, who rely mainly on mass media as a source of marketing information. This information comes from a centralized source, and represents national averages, and prices in one or two large cities. What farmers in remote areas need is information about the local marketing situation. The solution is to decentralize information dissemination and set up local marketing information centers, linked with the national center. Dissemination from the local centers is often by low-cost methods such as display boards in villages. The paper discusses current programs of this kind in several Asian countries including Indonesia, Taiwan, and Japan.

RESUMÉ: Ce document montre les difficultés de fournir des services d'informations réguliers, à temps et appropriés à des petits producteurs des zones géographiquement isolées d'Asie. La plupart des pays d'Asie tente de fournir des services d'information pour soutenir les producteurs dans leurs décisions relatives au choix des produits, des lieux et périodes de production, et au prix à attendre de ces produits. Certains de ces services assurés au moyen d'outils électroniques coûtent chers. Des études récentes montrent que ces services sont plus utiles pour les agences gouvernementales que pour les producteurs ruraux qui s'appuient essentiellement sur les médias comme source d'information sur les marchés. Cette information provient d'une source centralisée et donne des moyennes nationales et les prix sur une ou deux grandes villes. Or, les besoins des producteurs ruraux portent sur les conditions locales du marché. La solution est de décentraliser la diffusion de l'information par la création de centres locaux d'information sur les marchés, reliés au centre national. Ces centres locaux peuvent souvent assurer la diffusion à un bas prix en utilisant les tableaux d'affichage dans les villages. Ce document analyse des programmes de ce type en cours dans les pays asiatiques, y compris en Indonésie, en Taïwan et au Japon.

RESUMEN: El mercadeo en pequeñas fincas en Asia se presenta como un ejemplo de lo difícil que resulta proporcionar información relevante, de manera regular y oportuna, a los usuarios de lugares geográficamente remotos. La mayoría de los países asiáticos intenta ofrecer algún tipo de servicio de información sobre mercadeo que ayude a los agricultores a decidir qué deben producir, dónde y cuándo deben vender, y qué precio pueden esperar. Algunos de estos servicios son sistemas costosos de información electrónica. Estudios recientes indican, sin embargo, que este tipo de sistema es más útil para las entidades del gobierno central que para los agricultores, quienes dependen principalmente de los medios de comunicación masiva como fuente de información sobre mercadeo. Esta información viene de una fuente centralizada y representa los promedios nacionales y los precios en una o dos ciudades grandes. Lo que necesitan los agricultores en zonas remotas es información acerca de la situación local de mercadeo. La solución es descentralizar la difusión de la información y establecer centros locales de información sobre mercadeo, que estén vinculados con el centro nacional. La difusión desde los centros locales se realiza, a menudo, mediante métodos de bajo costo, por ejemplo, carteleras en las aldeas. El documento trata los programas actuales de este tipo en varios países asiáticos, incluyendo Indonesia, Taiwán y Japón.

> "…My food is what I grow in
> my own fields,
> My water is from the well I
> dug myself.
> The Emperor is far away,
> and no concern of mine."
>
> —Traditional (Work-song
> of Chinese farmers)

THE TERM "REMOTE" implies distance from centers of population and production where wealth is generated. Human settlements cluster where there is economic advantage and where land is fertile. In a few countries, the size of land holdings may be large enough to outweigh the disadvantage of distance, but this is not typical. In most cases, farmers in remote areas are resource poor with low incomes.

The robust independence of the poem above is not possible if farmers want to earn money from their farms. To do that, they have to produce a surplus and enter the market place. Farmers in remote areas are under a particular disadvantage in marketing. The economic constraint

imposed by distance is most marked in less industrialized countries with a poorly developed infrastructure. The difficulty of transporting agricultural produce, which by its nature tends to be heavy and bulky, is a major problem when the market place is distant and roads are poor. In the absence of a modern transport and distribution system, farm incomes in less industrialized countries tend to fall as the distance from large cities increases.

Among low-income farmers in Asia, there is a demand for information but not a market for it. Providing an information service may generate income for the farmers, but not for the agency which supplies it. Information services for low-income farmers are largely funded by national governments, supplemented by some international agencies. Whether the information source is national or international, there is a marked disparity between it and the farmers it services, in terms of wealth and status. The source of information serves as a center of decision making about what information to disseminate. Farmers do not make a financial contribution, and so are seldom consulted in these decisions. Low-income farmers in remote areas have little choice or control over the agricultural information they receive.

In absolute terms, they are not poor in information: they have a rich supply of it from their own traditional culture. However, as long as their society functions as a closed system using only local information, people in remote areas are at a disadvantage in dealing with the outside world. They do not share in any wealth generated by the national economy, they do not take part in economic development. They are also weak in defending what resources they have from powerful outside interests. It is logging companies and export firms who take the profit from the timber in remote areas, rather than the farmers on whose traditional lands the trees once grew.

This paper discusses marketing information, and the problems of communicating it to farmers in remote areas, in seven countries in Southeast and East Asia: Indonesia, Japan, Korea, Malaysia, Philippines, Taiwan and Thailand. Of this sample, all have free market economies. Some have a highly developed industrial economies with a good infrastructure, while others are less industrialized. However, they all share similar marketing problems, and all are finding it difficult to provide farmers with a good marketing information service.

Marketing information for farmers in remote areas has the same general problems as other types of agricultural information, plus some special problems of its own. It is even more location specific than technical information. Farmers need to know, not the average price over the whole nation, but an indication of the prices to expect in the actual marketing outlets to which they have access. Marketing information also has to be timely, and soon becomes obsolete. There is a deadline to its usefulness that does not usually apply to technical information.

Marketing: Some General Points

If we look at the information which farmers are receiving from extension departments and other sources, most of it is technical information aimed at increased production. However, in most Asian countries, and in fact throughout the world, increased production is the main concern only at a subsistence level. Once farmers start producing a surplus for the market, it is marketing which is the major problem. Many programs in Asia and elsewhere aimed at increasing agricultural production have failed after a few years, because although farmers did increase their output, they were unable to sell what they produced.

Farmers in Asia find agricultural marketing particularly difficult. Production is diversified and land holdings are generally small (on average around 2.4 acres (1 hectare) in Japan, Korea and Taiwan). As a result, the agricultural surpluses produced for market are being grown in small quantities on numerous small, scattered farms. This runs counter to efficient marketing, which by its nature implies a large sales volume of standardized products. Typically, marketing chains in Asia are long and there is a wide gap between the prices received by farmers and the prices being paid by consumers.

Marketing problems are especially severe with vegetables and fruits. Although these tend to be high-value crops, they are harvested seasonally and have a short storage life. It is common for periodic surpluses to occur, with a consequent fall in prices. This pattern of repeated surpluses and unstable prices is seen throughout Asia, both in wealthy industrialized countries and in less industrialized ones. When we discuss agricultural information in remote areas, we should perhaps consider what this information is for. Is it to raise production levels? Is it to raise farm incomes? Where there are marketing problems, and these exist almost everywhere, the two aims may be incompatible.

Marketing Information

Marketing information has a major effect on whether a farmer's production is profitable or not. First of all, farmers have to know about market demand if they are to respond efficiently to market forces. The main reliable source of information is the market itself, as prices reflect changes in supply and demand. Marketing information not only helps farmers make profitable decisions in the short term on when and where to market produce, and what price to expect; it also has another vital function, of helping farmers decide what to produce. Since there may be a time delay of months or years between investing in a crop and getting a profit, farmers who understand market trends and market opportunities have a

better chance of succeeding than those who do not.

The dealers who buy produce have a vested interest in keeping farm gate prices low and minimizing their risks. Generally they have much better access to market information than the small-scale farmers they buy from. It is common for farmers to end up bearing the greater part of the risk, while the dealers end up with the greater part of the profits.

Some Marketing Information Systems in Asia

In all seven of these Asian countries, the government operates a national government service. It is usually run by the Ministry of Agriculture or its equivalent, sometimes by several Ministries (for example in Thailand, it is jointly operated by the Ministry of Agriculture and Cooperatives and the Ministry of Commerce). There are often additional independent services for particular interest groups. As well as the government service, Japan has an information service operated by ZEN-NOH, the national farmers' cooperative organization. Malaysia, a major agricultural exporter, is the only one of the seven not to have a single government service covering all major crops. Instead, each major export crop has its own price information service, run by the special government agency that is also responsible for extension and technical research for that crop. Information about vegetables and other domestic food items in Malaysia is the work of FAMA, the Federal Government Marketing Authority. All these marketing information services are centralized, with a head office in the capital city staffed by highly trained agricultural economists and computer technologists. Computers are used at the head office for data storage and analysis, usually IBM mainframes.

Collection of Marketing Information – The essential data of marketing information is price data. We should keep in mind that agricultural price data are based on thousands or millions of transactions, many of them on a small scale, that are taking place every day all over the country. Collecting an adequate price sample and making sure that these are representative enough to be useful is not an easy task. Marketing information is perhaps rather different from technical information in agriculture, in that it is never expected to be 100% accurate.

In each country, the head office of the marketing information service is linked to numerous reporting stations in the provinces which report regularly on the local prices of a range of commodities. The head office collects the data, processes it and stores it. It is then passed on to government ministries, to become part of the basic statistical data about the nation's food supply and agriculture generally. Everyone understands that statistical data is necessary for policy making. However, this is not meant to be the only function of a marketing information service. In all seven countries it quite explicitly has another function, of helping farmers in their marketing decisions. In practice, the amount of information flowing to farmers from the center is limited. Furthermore, much of the marketing information which is disseminated goes unused, because it is not in a usable form.

Dissemination of Marketing Information – Although computers are used in all seven countries for collecting processing data, they are not much used in disseminating it to farmers. Even in highly industrialized countries like Japan, very few farmers use computers in farm management, and almost none use computers as a means of communication. Japan, Korea and Taiwan all have an electronic bulletin board system for marketing information, but few farmers make direct use of it. A survey in Korea found that when farmers are seeking price information for their marketing, in over 70% of cases the information is provided by other farmers (Choi 1993).

In all seven countries, the national marketing information service uses national media to bring marketing information to farmers. Lists of prices for vegetables, eggs and so forth are published daily or weekly in national newspapers. Most countries also provide national radio programs with information about current prices in selected markets. Bulletin boards are another common way of disseminating price information, and are required by law in some countries. The bulletin board is set up in the market place and updated daily or weekly. It may take the form of a blackboard, a notice board with printed price lists, or in industrialized countries may be a computerized display screen.

Effectiveness of Marketing Information Services – A.B. Friedlink, in summarizing a conference on information, applied a useful distinction between the effectiveness of an information system, "doing the right thing", and efficiency, "doing the thing right". The marketing information systems of these seven Asian countries are all "doing the thing right", in that they are making efficient use of available facilities and personnel to ensure that their data is as complete and accurate as possible. They are "doing the right thing" only if farmers' needs are not taken into account. At a recent international workshop on marketing information services for farmers in the Asian and Pacific region[1], it was concluded that farmers in less industrialized countries of the region are receiving minimal benefit from national marketing information services.

There are two main problems. The first is that the output of these national marketing information services tends to be raw price data. This may be averaged or summarized, but it is not given further processing to make it informative for ordinary people. Long lists of prices are difficult to understand. If Asian

farmers want to use this information to understand the market situation, or identify price trends over time, or discover new marketing opportunities, they have to do it for themselves.

The second problem is that what is being disseminated is the national average price, or the prices in the capital city. When price information is sent in from the provinces to the central government office, it is usually combined with data from other provinces to make a national average. This is quite satisfactory when the figures are being used as government statistics. When they are being used as marketing information for farmers, however, combining data from different areas robs it of most of its value. Farmers need price information from the markets they are using. A national average is an abstraction which hides the considerable difference in prices between one place and another.

What Information Do Farmers Need? – If farmers' interests were the prime consideration, we could expect marketing information services to be dealing with rather different kinds of information. We can get some indication of what these might be if we look at some of the marketing radio programs in the Philippines. Most of these radio programs are small pilot projects, which are testing various formats and approaches, and which have local or provincial coverage. They are sometimes supported by overseas funding with the express intention of providing information to small-scale farmers to aid them in their marketing decisions. One such program is "Bantay Presyo" ("Price Watch"), run by the University of the Philippines at Los Banos as part of a Sustainable Agriculture Program. Price Watch is a 30-minute radio program broadcast every Wednesday morning. It has four main sections: the first is news stories likely to be of interest to listeners; the second section is called "Price News", and presents prices of vari-

ous commodities in what is designed to be an interesting format, such as interviews and voice clips. The third section presents success stories of local agricultural entrepreneurs. The final section, "Additional Knowledge", deals with facts and trivia about various agricultural commodities that may interest listeners (Librero 1994).

Another example is the broiler information service of Taiwan. Although Taiwan has many wholesale markets all over the island which provide basic price data, broilers are not usually sold through these markets. Instead, they are sold directly to local dealers or slaughter houses. On most modern broiler farms, the whole flock of chickens is sold as soon as the birds reach market weight on an all-in, all-out basis. Broiler farmers have to try and predict future prices when they are deciding how many young chicks to rear. For years there has been a tendency in Taiwan for both numbers of broilers and their prices to rise and fall sharply, as many farmers respond in unison to high or low prices. To improve this situation, a special marketing information service for broilers began operations in 1992. It receives government funding, but is run by the Poultry Association, which represents all parts of the poultry industry—farmers' associations, dealers, chick breeders and slaughterhouses. It is a decentralized system, in which information is collected by 80 local reporters who are unpaid volunteers. An information sheet is published every morning showing actual trading prices in each of the four regions the previous day, a list of regional reference prices, a discussion of the supply and demand situation, and a summarized market analysis. As well as the news sheet, the information is also available in a telephone service and in daily newspapers, while the Poultry Association publishes a monthly newsletter.

Two important points about this service: first, it was begun largely in response to pressure from farmers,

in response to their felt needs for more information in a situation where unstable prices involved a high level of risk. Second, most of the information in the system is collected on a voluntary basis by the farmers themselves, so the system is highly dependent on farmers' goodwill and support. It is difficult to measure the effect of an information service, since this is often indirect and long-term. However, it is interesting that after this service for broiler farmers began, fluctuations in broiler prices were reduced while average prices rose[2] (Kuo 1994).

Conclusion

Each of these seven governments has recognized the importance of a marketing information service by investing large sums in it. Such services are expensive. Japan's Ministry of Agriculture, Forestry and Fisheries spends US$9.5 million every year maintaining and operating its information service for fruit and vegetables alone, and this is only one part of the whole marketing information system under the Ministry. This in turn is only one of several agricultural marketing information systems in Japan. The less industrialized countries have less to spend, but still have allocated comparatively large sums. As a result, there are enough highly trained staff and computerized facilities for technology not to be a major constraint to data handling and storage at the head office in any of the seven countries. However, although farmers are among the intended beneficiaries, the actual benefit to farmers is limited.

One reason for this lies in the fact that in all seven countries, most agricultural marketing information is collected and disseminated by centralized government institutions. They do a good job of providing information to the government which funds them. They are less successful at communicating it in a usable form to farmers. Farmers' needs are not given priority when the infor-

mation system is set up, or in the day-to-day running of the system. There is not only geographical distance between farmers and the central office, but a social distance of status and wealth. The centralized information source does not need or use feedback from farmers in its functioning. The farmers are not clients, they make no payment for the information they receive, and they have little or no impact on the form it takes. Smaller decentralized systems in which farmers play an active role are likely to be more responsive to farmers' needs.

Second, national marketing information services in each country are using computers for data storage and processing, and sometimes for electronic networking. Computers are capable of handling and storing large amounts of data, and an information system which uses them tends to end up with large databases. This is all the more likely with marketing information, since the marketing system in the course of its normal functioning produces every day vast quantities of data. Prices are being collected from dozens of markets, for every major kind of fruit and vegetable, all with different grades of size and freshness; to these are added the prices of various grains, including feed grain for livestock, and the livestock themselves, and their various products. It is easy to assume, when one has collected a huge volume of data, that one has done something useful. In fact, this data has little value until it has been processed, so that the user can easily find the information needed. This step, of processing data in order to increase its relevance and value, is frequently a weak point in information services.

In fact, the use of sophisticated computer equipment in an information service does not necessarily mean that it is providing a more effi-cient service than low-tech solutions such as radio programs and black-boards in market places. The value of a system should be judged by the extent to which it meets the needs of the user. In remote areas of rural Asia, few farmers own computers or have computer skills. Farmers may be better served by simple technology which communicates information in a lucid and relevant way.

Third, the concept of a marketing information service in Western countries implies an impersonal service for individual users. This might not be relevant in many parts of the world, where farmers are accustomed to receiving information by virtue of their membership of a particular social group. Marketing and other information services might benefit by making use of traditional social groupings and channels of information, rather than setting up competing new ones.

Finally, in our enthusiasm for what electronic information systems can do, we must not forget the problem of equity. If this is overlooked, it seems likely that unequal access to highly effective information systems is going to follow and reinforce the present inequalities of wealth. The information highway was once seen as a mechanism for crosscutting old power structures and facilitating learning. Unfortunately, it costs a lot to travel on it. Use of the information highway involves expensive equipment and a good telecommunications network. The information highway is not a free road; it has a toll booth. If we emphasize electronic technology too much in agricultural information, we may find we are helping only those who already have the best access to information to get more of it.

NOTES

1. International workshop on Agricultural Marketing Information Systems in Asian and Pacific Countries, held at Taiwan National University, Taipei, October 1994.

2. Before the program, prices per kilogram ranged from US$ 0.84–US$ 2.20, with an average of c. US$1.36/kg. In the two years after the program began (1992–1994) there was a narrower price range of US$1.40–1.72, with an average price of NT$1.52/kg (Kuo 1994).

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JAN BAY-PETERSEN is the Information Officer at the Food and Fertilizer Technology Center for the Asian and Pacific Region, Taipei, Taiwan.

CONTACT ADDRESS:

Jan Bay-Petersen
Food and Fertilizer Technology Center
for ASPAC Region
14 Wenchow Street
Taipei
TAIWAN
E-Mail: bay@transend.com.tw

Agronet — A Business Branch Oriented Network for the Agro-industry

Pekka Haavisto and Jukka Öfversten

ABSTRACT: The Agronet was started in 1992 as a supplement to the networking strategy of the Finnish Agropolis Science Park. In Agronet the conceptual idea of networking is taken further to a practical level. This real network connects the main suppliers and users of information services in Finnish agri-business. It is based on the integration of the latest information technology. Yet the main focus is on identification of sought-after services; not on technical development. A typical user of this network is both a provider and a user of the services. By technical nature, the typical services may be classified as electronic mail, information dissemination, information management as well as responding to ad hoc service requests. Classified by their contents, these services comprise real time advisory services, price information, product information, library services, farm business management, bank transactions and so forth. The users include farmers, extension service, research institutes, administration, industry, entrepreneurs and consumers. By 1995 it is expected that Agronet will be commercially profitable.

RESUMÉ: Agronet a commencé en 1992 dans le cadre de la stratégie du réseau du Parc scientifique Agropolis finlandais. Il s'agit d'un réseau qui relie les principaux fournisseurs et consommateurs d'information agro-industrielle finlandais. Ce réseau s'appuie sur l'intégration des dernières technologies de l'information. Toutefois le principal domaine de concentration est l'identification des services recherchées et non sur les développements technologiques. L'utilisateur typique de ce réseau est à la fois, le fournisseur et l'utilisateur de ces services. Ces services peuvent être classés techniquement sous : courrier électronique, service de diffusion d'information, gestion de l'information, ou service question-

sréponses. Selon leurs contenus, ces services comprennent : des services de conseil en temps réel, des information sur les prix, des produits documentaires et services de bibliothèques, des informations sur la gestion des exploitations agricoles ou sur les transactions bancaires, des services de vulgarisation, etc. Les utilisateurs sont : les fermiers, les services de vulgarisation, les institutions de recherche, l'administration, l'industrie, les entreprises et les consommateurs. Les premiers résultats laissent penser qu'Agronet sera commercialement profitable à partir de 1995.

RESUMEN: En 1992 se creó la red Agronet como un complemento de la estrategia de trabajo en redes de Agropolis Science Park de Finlandia. En Agronet se lleva la idea conceptual del trabajo en redes a un nivel más práctico. Esta auténtica red conecta a los principales proveedores y usuarios de los servicios de información con las empresas agrícolas finlandeses. Aunque la red se basa en la integración de la tecnología de información más reciente, su principal énfasis está en la identificación de servicios que tienen mucha demanda y no en el desarrollo técnico. Un usuario típico de esta red es tanto un proveedor como un usuario de los servicios. Por su naturaleza técnica, los servicios típicos pueden clasificarse como correo electrónico, difusión de la información, manejo de información y respuesta a las solicitudes de servicio ad hoc. Cuando estos servicios se clasifican por su contenido, comprenden servicios de asesoría en tiempo efectivo, información sobre precios, información sobre productos, servicios de biblioteca, manejo de empresas agrícolas, transacciones bancarias, y así sucesivamente. Los usuarios incluyen a agricultores, extensionistas, institutos de investigación, administradores, industriales, empresarios y consumidores. Se espera que, para 1995, Agronet sea rentable desde el punto de vista comercial.

FINLAND IS A sparsely populated country with a well established agro-industry. It also has a long and honourable history of agricultural research and extension work. From the farmer's point of view more than enough knowledge is available. This is important because information is becoming increasingly important. Only valid up-to-date information can provide the farmer with all he needs to know if he is to manage his farm successfully. Unfortunately there is more to it than that. Being able to obtain the necessary information at exactly the right time and in the right form is a continuous problem.

Information can be classified as either internal or external. Both are important for the success of any farm business. Examples of internal information include budgeting, accounting, operative planning and management data, whilst external information comprises marketing, new research findings and other commercial production factors. External knowledge is also required to help the farmer to face up to the changing competitive situation between farmers and other interest groups. Only when both types of knowledge are properly integrated and processed can a farm enterprise gain a significant competive edge over its competitors. The Agronet information network is intended for the joint use of rural entrepreneurs and other interest groups working in the many fields of the agro-industry.

Agronet Background

The origins of the Agronet date back to the data processing environment of the Agricultural Research Centre of Finland. The Centre has more then 20 branches scattered all over Finland. In recent years, the research policy of this academic institution has increasingly focused on the dissemination of its research findings and on collaboration with commercial enterprises. In the early 1990s, networking became topical in all its organizational planning and development. In this climate, a new design project was launched in 1992 to complement the networking strategy of the Finnish Agropolis Science Park. The objectives of this project were to identify and specify the tools and middleware services needed to integrate the latest innovations and research findings with practical farming and the commercial agro-industry.

From the very beginning it was evident that telecommunications and electronic networking offered the best possible way of achieving these aims. The Agricultural Research Centre of Finland did not originally intend to expand its current network. It was to be used simply as a technical basis for the Agronet—a new sector-oriented network. The prerequisites were all there. Due to its geographic dispersion, the Agricultural Research Centre had established an internal network that connected the computing resources of its various units. The Finnish Association of Rural Advisory Centres was involved as a potential partner with sound experience in the use of distributed data processing as an advisory tool. Several commercial enterprises also expressed interest in collaborating. Further, governments and local authorities likewise looked with favour on the Agronet, to say nothing of Finnish farmers eager to get real returns on their investments in personal computers and data modems. The network was developed in the following phases: review of the existing networks and their potential (1992); drafting and documentation of information service processes (1993); implementation of a shared user interface in Finnish (1994); provision of access and services to international networks (1995).

Agronet Concept

The Agronet aims to provide a general framework for telematic information services throughout the Finnish agro-industry. The main idea is to utilize existing networks and technologies in generating services, not to develop new electronic network technology. The Agronet concept is based on universally accepted standards. It's not one single physical network, but a collection of services, service providers and electronic networks with a shared Finnish user interface.

The Agronet project has been a joint venture of the whole Finnish agro-industry. Many of the services are provided jointly by several collaborating parties. Some of the main reasons for the successful cooperation are: the increasing competition caused by EC membership; the high standard of Finnish telematic services; the good availability of instruction in the use of PC's in farm production management, and the long practical experience already accumulated. Because most agro-industrial organisations had already computerized their services the main challenge was simply to collect and convert them within a common shared Agronet user interface. This entailed defining and selecting the services needed; defining processes for service production; planning user friendly interface lay-outs; generating the necessary operating and support services; generating a system to maintain and update services; training people to use the network; and making information available about the network and its services.

Achievements To Date

The present network offers a stabilized technical front-end to electronic mail services, bulletin board services and file transfer services plus remote login services, access to other networks and navigation tools. Applications currently comprise general information services, special price and product information, real time advisory and meteorological services, library services, farm business and production management services and bank connections. Users include farmers, research institutes, commercial and industrial enterprises, administrative organizations and consumers.

At present the network is most commonly used for its information services, weather forecasts, advisory instructions and check lists and, the some extent for direct marketing services. New services added in 1995 include databases for information on national and EC-related agricultural regulations, a new service reference system and a new graphical user interface for dial-up telephone connections. The latter service has been implemented in close cooperation with the leading Finnish telephone and telecommunications company—Finnish Telecom. With the graphical interface, a farmer can utilize graphical multimedia servlces, for example, expert systems for pest control and realtime meteorological services.

Prospects

Our current efforts focus on marketing and publicizing Agronet services. At the same time, we are continuously adding new generic services. The number of the service providers and end-users is expected to grow. As a general trend, the services are expected become increasingly specialized and customer oriented. At the same time we expect a rapid increase in joint multivendor manufacturing of generic application services. We are also working on a further simplification of the present user interface and navigation tools. In particular, we are translating the interface, the navigation tools and some of the basic application services into English.

In the future, the Agronet is expected to offer a basic standardized platform for multivendor service manufacturing and service utilization for every aspect of the Finnish agro-industry. This should improve the ability of our agro-industry to survive on the highly competitive international market that lies ahead.

Conclusion

Telematic technology and electronic networks have proved to have great potential for creating new information services for both individual farmers and the agro-industry as a whole. However, because of the limitations of existing organizational and public open networks, there is clearly a need for specific sector oriented networks. Such networks can be constructed as a joint effort by several partners. They have the major advantage that info services can be provided for one specific community, in this case, the agro-industrial community; the users of the services include all the actors in the community: farmers as well as academics.

The main challenge lies not so much in networking or data processing techniques as in ensuring that all parties make a concerted effort to define and create the services needed. All that then remains is the continuos updating of information and provision of simple, user-friendly access.

Learning More

You can test the Agronet via the Internet using the command: telnet agronet.mtt.fi and the username: agronet. The services and navigation tools are still mostly in Finnish

Figure 1 – Login Statistics of Agronet Services in 1994
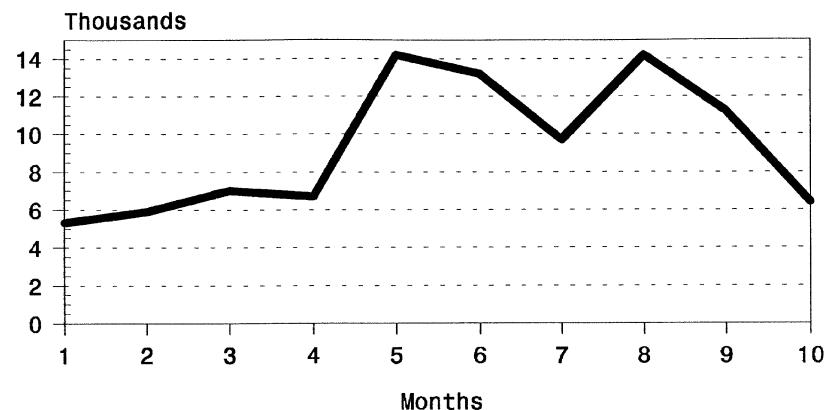
Figure 2 – Use of Agronet Service Types in 1994
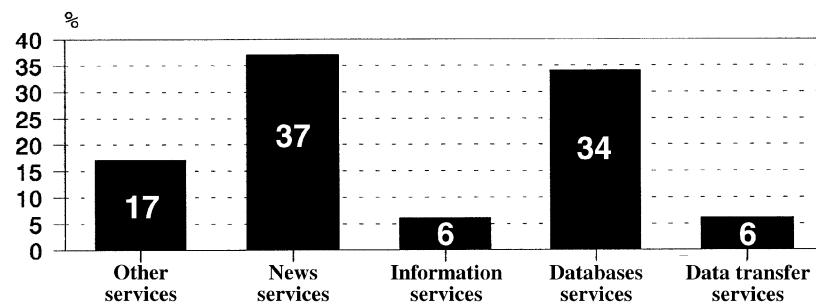
but we're busy translating them into English. We would appreciate any comments and proposals for cooperation or direct communication. Please contact Pekka Haavisto with any technical questions or, Jukka Öf versten with queries of a more general nature using the Internet addresses below.

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CONTACT ADDRESSES:

Pekka Haavisto
Agricultural Research Centre of Finland
Data and Information Services
Fin-31600 Jokioinen
FINLAND
Fax: +358-16-4188-339
E-Mail: pekka.haavisto@mtt.fi

Jukka Öfversten
Agricultural Research Centre of Finland
Data and Information Services
Fin-31600 Jokioinen
FINLAND
Fax: +358-16-4188-339
E-Mail: jukka.ofversten@mtt.fi

CALM: An Adventure in the Diffusion of Agricultural Communication Technology

Chris Le Gras and Howard Gardner

ABSTRACT: The birth and growth of Computer Aided Livestock Marketing (CALM), an electronic auction for livestock launched in 1987 by the Australian Meat and Livestock Board, throws light on the introduction and diffusion of an innovation in highly traditional agricultural, social and industry systems in which old-established and competing alternative methods of trade and communication exist. Presently, CALM is in a transitional phase from a national electronic marketing facility to an international electronic communication system. The potential of CALM, its application in other countries, the lessons which could be learnt in Australia and perhaps universally from its diffusion, are issues which are now being evaluated.

RESUMÉ: CALM est un service de marketing sur l'élevage assisté par ordinateur initié en 1987 par la Compagnie australienne de l'élevage et de la viande. Son introduction dans un secteur agricole fortement traditionnel avec un système social et industriel où coexistent des établissements classiques et des méthodes de commercialisation et de communication compétitives, apporent des perspectives favorables dans ce domaine. Actuellement, CALM est dans une phase transitoire, d'un service national de facilitation par marketing électronique à un système de communication électronique international. Les potentialités du CALM, ses applications dans d'autres pays, et les expériences australiennes sont en cours d'évaluation.

RESUMEN: En 1987 el Consejo de Ganadería y Asuntos Pecuarios de Australia lanzó una subasta electrónica para ganado, denominada CALM por su acrónimo en inglés de Mercadeo Pecuario Asistido por Computador. El origen y el desarrollo de esta subasta indican la introducción y difusión de una innovación en sistemas agrícolas, sociales e industriales que han sido muy tradicionales y en los cuales compiten métodos alternos de comercio y comunicación con métodos establecidos y reconocidos desde hace mucho tiempo. Actualmente, CALM se encuentra en una fase de transición, de un medio nacional de mercadeo electrónico a un sistema internacional de comunicación electrónico. En la actualidad se están evaluando el potencial de CALM, su aplicación en otros países, y las lecciones que podrían aprenderse de su difusión en Australia y, quizás, a nivel mundial.

CALM— What it is and How it Works

Computer Aided Livestock Marketing (CALM) is an interactive electronic communication system in which almost any number of people can be connected at the same time through computers connected to the telephone system. CALM's main current use is as an electronic saleyard for buying and selling cattle, lambs, sheep and pigs. But it also serves as an increasingly important medium for the dissemination of news and information.

In its selling function, livestock are offered and bought "sight unseen" on individual computers anywhere in Australia. The computers of buyers and sellers are linked through Telecom's packet switching network Austpac to the main CALM computer in Sydney which conducts an electronic auction. The basis of trading is an objective description which enables the buyers to evaluate and compare livestock offered. The language by which livestock are described is a uniform trading language developed by AUS-MEAT, an arm of the Australian Meat and Livestock Corporation, in conjunction with industry.

Livestock are assessed by accredited persons who have reached a required standard of skill through a special training program. Data describing the livestock to be sold are entered through the computer of the market operator who then creates a sales catalogue which is available to all potential buyers. Buyers then obtain through their computers a description of all livestock offered and are able to bid on those which meet their requirements.

Auctions are organised and supervised by a market operator. The operator could be CALM itself, or an independent livestock agent. The auction is conducted by the CALM computer according to a standard set of rules. Several electronic auctions are run every week. Auctions may be held simultaneously, when up to 40 lots can be auctioned at one time, or sequentially, where lots are offered one by one.

Buyers make their bids on computers or terminals in their own offices. They can also insert limit bids into the system, and thus need not be near a computer when the sale is on. The CALM computer tells the buyer when his bid has been registered and when it is the lead bid. A timer automatically terminates the

auction after a designated period after bidding stops, and those lots which have passed the owner's reserve are sold to the leading bidder. If the bid price has not reached the reserve, the leading bidder can ask the system for the reserve, and it is his prerogative to accept or reject the lot at that price. If the buyer rejects the price, a sale may be negotiated at a lesser price.

A sales contract is automatically created by the computer, listing parties to the transaction and the terms of sale. Buyers arrange transport for the stock from the delivery point nominated by the vendor.

One highly significant economic advantage of the CALM auction system is that it enables livestock to remain on the property until sold. The owner does not have to send stock to a saleyard for auction, nor does the buyer have to attend that saleyard to buy. The distance between buyer, seller and livestock becomes irrelevant in the primary market. Despite its apparent complexity, CALM works efficiently with very few technical problems.

CALM is run by a board comprising representatives of cattle, sheep and pig producers, the meat trade, meat exporters, stock agents and the Australian Meat and Livestock Corporation which has the ultimate legal responsibility for CALM.

Origins of CALM

The concept of CALM owes much to the vast spaces of the Australian continent, to the sense of isolation from markets and buyers that many graziers have, to the frustration of trading livestock using traditional sets of vague and subjective descriptions that can vary from region to region, and to a dedicated band of agricultural innovators.

The desirability of a standard language of livestock description has been acknowledged for many decades in Australia. But the difficulties of producing a language which was acceptable to all participants in the meat and livestock industry were enormous. Differences in local traditions and standards, varying climatic conditions which affected production methods and output, differing breeds of livestock and genetic background, conflicting perceptions of desirable characteristics in the minds of stud breeders, commercial producers, abattoirs and butchers, retailers and end consumers, and poor basic marketing data to work with, led to endless debate, no agreement and inevitable inefficiencies in the marketing chain.

According to the first chairman of CALM, Mr P D A Wright, in an address to the Alberta (USA) Beef Symposium in 1988, first exposure in Australia to the basic concepts of sale of livestock by description and uniform language took place at an international forum on carcase classification sponsored by the then Australian Meat Board in Adelaide, South Australia, in 1972. Following the forum, the Board initiated research on the use of computers in livestock sales by description. The Australian Meat Research Committee provided about $1 million to fund this work which was carried out initially by the Australian Business Research Institute housed at the University of New England, Armidale, NSW. The system evolved by the Institute was called New England Livestock Computer Marketing, and was the forerunner of CALM.

Subsequently, the Queensland Meat Industry Authority began work on a similar system known as Quest, and the West Australian Department of Agriculture started developing another and also similar system known as CLASS. Wright says that much of the technology embodied in CALM was designed, tested and proven within these three research projects. CALM was launched on 1 July 1987, 15 years after the concept was first discussed in Adelaide. However, it had been in a progressively developing trial phase for about two years before this.

Impact of CALM on Cultural Norms in Agriculture

CALM is a significant development for agriculture in several areas. First, it is a true innovation which we believe is unique in world agriculture. The CALM adventure is about the difficulties, successes and failures inherent in the diffusion of a complex technical innovation in a highly traditional industry environment. In global agriculture, most innovations face the same path and difficulties.

Wright (1988) described it as "… a world first, and as such there was no precedent to follow, no guarantee of success, and therefore virtually every step was taken tentatively in the dark."

CALM is, therefore, a particularly useful innovation through which to study the role of culture in agriculture. It represents a radical, new technology introduced into a highly traditional social system and industry in which there are existing, old-established alternative methods of selling livestock, such as saleyard auctions. The conflicting vested interests surrounding CALM are represented, as Wright points out, around the CALM Board table. It is common knowledge, and there is much evidence in press reports and the records of meetings and symposia, that part of the Australian agency sector which are strongly committed to saleyard auctions, have seen CALM as a threat to their commercial operations (*Land*, [newspaper] throughout 1988, especially July 21, 28, August 18, September 8). This threat is not altogether without foundation. Most livestock sales in Australia take place through agents, and CALM provides a technologically advanced system that was seen at the time as having the potential to eventually by-pass to a significant degree the services of agents. Wright not only recognised the influence of competing vested interests, but also the difficulty of having industry adopt radical and

complex changes to traditional industry custom and practice. He said:

> … resistance generated by fear of change, brought about by the introduction of new technology will remain for some time as major challenges in our path. Indeed, the natural human resistance to change, as well as power and social fabric of tradition, will be constraints on the growth of CALM in the immediate future. (Wright, 1988, p 4).

CALM's Position on the Diffusion Curve

It is instructive to try and assess CALM's current position on the Rogers (1983) diffusion of innovation bell-shaped curve. This curve breaks the diffusion process over time and the potential adopter population into five segments—innovators, those who initiate the adoption and account for about 2.5 percent of the first users of the innovation in the population, early adopters, about 13.5 percent, early majority about 34 percent, late majority about 34 percent, and laggards about 16 percent.

It is estimated that in December, 1987, about 500 producers were using CALM to sell livestock, many through agents who were principally the pastoral companies of Australia. The Australian Meat and Livestock Corporation's Producer Register at that time listed the names of about 20,000 cattle and sheep producers. The Register does not cover all producers in Australia, as registration in not compulsory. It should also be noted that not all producers on the Register, for a variety of reasons, are able to use CALM. Today, about 6,000 producers use CALM. This suggests that CALM, despite solid progress, is still in the relatively early stages of the adoption curve for livestock producers, and that its potential in this area is unfulfilled. Rogers' general diffusion paradigm is particularly helpful in diagnosing the strengths, weaknesses, problems and speed of adoption of CALM.

Some Barriers to Adoption

The successful diffusion of any innovation is a complex process, with many difficulties to be faced by both the promoter of the innovation and those wanting to adopt it. Peter Drucker (1986) says there is some evidence to suggest that the lead time for knowledge to become applicable technology and to begin to be accepted on the market is between 25 and 35 years. If this is correct, CALM appears to be travelling fast. But its journey has been difficult.

Apart from the problems of change mentioned by Wright (1988), CALM initially suffered from a variety of impediments, some of which were mainly perceptual rather than factual, but which nevertheless acted as deterrents to adoption. Le Gras (1989) found preliminary evidence of some barriers to adoption. These included the fact that major sources of knowledge and advice on livestock selling methods (agents and rural media) tended to be antagonistic to CALM. For the majority of producers, CALM was seen as having no advantage relative to existing selling systems (in costs, benefits), nor was it seen as compatible with main existing systems. It was also seen as too difficult to use. Key communication channels impacting on the adoption of CALM were influenced by vested interests opposed to its adoption. Moreover, CALM was largely unable to contest these perceptions adequately because of limited resources.

Some of the problems were factual. For example, computer literacy in country areas was poor at the time, adding to the perception of difficulty. Use of computers by primary industry is growing, but still lags behind that of other industries and urban areas. The promoters of CALM had no trouble in identifying with what Niccolo Machiavelli had to say about innovation in 1513: "There is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage than the creation of a new order of things…"

The innovator makes enemies of all those who prospered under the old order, and only lukewarm support is forthcoming from those who would prosper under the new. But despite these difficulties, CALM grew quickly.

Growth of CALM

The following figures illustrate the growth of CALM.

	Number of stock sold on CALM	
Species	Financial year to 30/6/88	Financial year to 30/6/94
Cattle	110,000	312,000
Lambs	300,000	430,000
Sheep	208,000	1,100,000
Pigs	40,000	88,000

Since its inception, livestock to the value of A$850 million has been traded on CALM.

It is interesting to note that CALM in February 1988 had 19 field staff based throughout Australia in the main livestock producing areas. Today it has 16. It also had 600 cattle and 400 sheep assessors spread throughout Australia. Today it has 4,200 registered assessors. In 1988, it had 940 registered users. Today it has 30,124.

From the start, its information services were expanded rapidly. Planned were a "bid and offer" market which would provide a national listing service for livestock exchange, a transport market to increase the efficiency of stock movement and transport networks, and more specific carcase kill data to increase the information available to producers about their product so as to enable them to better meet market demand.

Economic Significance

So far, no formal studies have been made to assess CALM's economic contribution to the Australian meat and livestock industry. But there is little doubt that it is considerable.

CALM facilitates the transfer of ownership of livestock from producer to processor and reduces the costs of moving livestock and people to and from markets. The CALM system incurs costs, a major component of which is the assessment of livestock, but these appear economically significantly less than the costs of running and maintaining saleyards, sending cattle to yards where they have to be unloaded and handled, then sold and re-shipped to meat processors often hundreds of kilometres away. Livestock stay on farm until sold, and apart from the freight savings to the producers, should be in better condition and produce higher meat yields when they reach the processor, thereby increasing overall industry productivity.

CALM makes an increasing contribution to market knowledge in the industry. It expedites and increases the flow of supply and demand information up and down the marketing pipeline. This not only makes for a more efficient market, but allows the farmer to adapt his production strategy to take advantage of market developments much more quickly than would otherwise be the case. CALM has played a key role in helping to shift the focus of the farmer from that of production to that of meeting consumer preferences.

CALM performs other functions which add value to the livestock industry. These include intensifying the activity on development of objective measurement and description of livestock; selling livestock on a forward delivery basis, by auction; and "interfacing" with saleyard and on-property sales to expand buyer competition.

CALM in Transition

CALM today is being put to uses other than livestock sales.

The CALM Board has always seen information flow to the livestock and meat industry, and to agriculture as a whole, as one of

CALM's greatest long-term contributions. CALM has a growing electronic news service which produces on a 24-hour-a-day basis news and commentary on the livestock, meat and wool markets, on currency, interest rates, rural property and other areas of interest to primary producers. This is available to all CALM subscribers. It has a bulletin board facility on which messages can be left for other subscribers. This could be used by closed-user groups.

CALM has proved its flexibility as a national electronic market for a diversity of products. In 1994, it auctioned successfully milk runs in Brisbane, while grain has been traded on the CALM exchange since 1989. A proforma system for the sale of wool has been developed. A feasibility study was concluded on 4 January 1995 on behalf of the Queensland Banana Growers' Federation, and discussions are being held with the Australian United Fruit and Vegetable Growers' Association on establishing local and national electronic markets on CALM for the sale of fruit and vegetables.

Potential of CALM

The true potential of CALM as an electronic communication facility which can be used by two parties interactively or as a mass communication medium has hardly been touched. Despite its originally perceived complexity, it has become progressively more user-friendly. It is now a comparatively simple matter for users to log on and withdraw, or put in, a wide variety of information. It has great potential for distance education, it could hold and quickly update a wide variety of databases for industry, and its personal and mass communication facilities could be expanded rapidly for a range of commercial purposes. CALM has proved to be highly cost-effective in distributing information and as an interactive communication medium, a valuable asset for any industry or country as the pace of world economic and

technological change quickens. Advanced technological developments in electronics and communication are certain to work for CALM. Development of facilities, such as increasing satellite use and radio transmission, will break existing technological boundaries and make CALM even more effective.

In the event of any crisis developing, such as an exotic disease outbreak, CALM has the only easily accessible national communication system in place.

This could be harnessed overnight and be used to manage such a crisis.

Privatisation

CALM is in the process of being privatised. Negotiations have begun to sell a substantial interest in CALM to firms which have the resources to further its development and uses. The Australian Meat and Livestock Corporation will retain a majority interest for the time being. When these negotiations are completed, CALM will enter a new phase of its development.

Internationalisation

The true potential of CALM, the lessons which could be learnt in Australia and perhaps universally from its diffusion, and its application in other countries, are issues which we are now beginning to evaluate. CALM has already created interest internationally, with current inquiries from both Argentina and European interests.

Where to From Here?

CALM has been a successful innovation operating in the real commercial world. As with most innovation, the legacy of knowledge will always prove of value and use, but in terms of making a national contribution, permanency is essential. Despite some fleeting doubts at different times during the last 10 years, there is no doubt now that CALM

has progressed beyond the experimentation phase and is in transition from a livestock-oriented communication system to a modern facility which can be harnessed to achieve the change of ownership of any product that can be accurately described.

Whether we are considering rural commodities, vacant seats on aeroplanes or in theatres, or the change of ownership of media advertising space, the principles remain the same. There is a need for accurate information to be conveyed from a potential seller to a potential buyer. The CALM communication system not only provides this opportunity, but the fact that it does so between potential sellers and buyers who would not otherwise be able to identify each other, represents the real value of the system. If it simply automated what is now being done between people or organisations know to each other, then its benefits could rightly be questioned.

Internationally, it is interesting to note that, despite some genuine but poorly funded attempts in the United States, Canada and the United Kingdom, there is no system available anywhere else in the world that can currently be compared with CALM. Our research confirms there is demand for greater utilisation of computer communications for commercial trading in most developed countries. This potential provides CALM with a unique opportunity to export Australian technology.

In the process of privatisation, which is likely to be formalised in the next month, additional resources will be available for the expansion of the current CALM into other product areas as well as the international arena. Perhaps the word "livestock" will be removed from the name and we will have Computer Aided Marketing. Irrespective of the name, it is essential that the organisation continues to ensure that it is at the leading edge of technology and that its knowledge and experience is made available to all interested industries. To do otherwise would be to invite the development of an alternate communication trading system. The pending privatisation will enable the new Board of the restructured CALM to inject additional resources in order to capitalise on the potential for the expansion of this exciting and innovative electronic communication system in the commercial world.

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CHRIS LE GRAS, a communication and media consultant, is managing director of Chris Le Gras and Partners Pty Ltd and a former president of the Agricultural Information Association for Australasia. A study of CALM's diffusion was part of his PhD thesis; Howard Gardner, chief executive of CALM since its inception, has been involved in planning and administering strategies for its development and wider use.

CONTACT ADDRESS:

Christian Le Gras
Chris Le Gras & Partners Pty Ltd.
P.O. Box 19
Hornsby
NWS 2077
AUSTRALIA

Participatory Rural Appraisal Concepts Applied to Agricultural Extension: A Case Study in Sumatra

Chris Landon-Lane

ABSTRACT: In an agricultural extension project in a number of locations in Sumatra, Indonesia, a participatory approach was taken to the analysis of individual farming systems and to the process of formulating agricultural advice. The approach described here involved communication between farmers, village officials, local non-government organisations, extension workers and professional agriculturists in a participatory manner rather than the common top-down advisory approach which has tended to ignore farmer's knowledge. The participatory approach effectively changed the adviser's position from 'outsider' to 'insider', contributing expertise on a similar level to others in the community to problem formulation and generation of solutions.

RESUMÉ: Un projet de vulgarisation agricole, mené dans certains endroits de Sumatra, en Indonésie, a adopté l'approche participative pour l'analyse de systèmes individuels d'élevage et pour fournir des conseils agrcioles. L'approche ici décrite suppose une communication entre les agriculteurs, les autorités villageoises, les organisations locales non gouvernementales, les vulgarisateurs et les professionnels travaillant dans le domaine agricole, d'une manière participative plutôt que l'approche verticale (conseils du sommet vers la base) qui tend a ignorer la connaissance des fermiers. L'approche participative change effectivement le rôle du conseiller qui d'observateur externe devient observateur interne, apportant son expertise aux autres à un même niveau pour identifier les problèmes et obtenir des solutions.

RESUMEN: En un proyecto de extensión agrícola realizado en varias locali-dades de Sumatra (Indonesia), se aplicó un enfoque participativo para analizar los sistemas de explotación agrícola en fincas individuales y para dar asesoría agrícola. El enfoque descrito a continuación consistió en promover una comunicación entre agricultores, funcionarios oficiales a nivel de la aldea, organizaciones no gubernamentales locales, extensionistas y agricultores profesionales que se basará en un enfoque participativo y no en el enfoque común que se aplica en las asesorías de arriba-abajo en que se ignora los conocimientos del agricultor. El enfoque participativo cambió eficazmente la posición del asesor: de ser una persona 'extraña' pasó a ser 'miembro de la comunidad', aportando sus conocimientos expertos a un nivel similar al de los demás miembros de la comunidad para identificar problemas y generar soluciones.

Farmer Participation in Development— A Background

It has been said before that it is no longer necessary to argue the relevance of socioeconomic considerations in agricultural research (for example Anderson, Dillon and Hardaker, 1985), but the heady achievements in large-scale agriculture during the Green Revolution remain unattainable for many resource-poor farmers in isolated regions (Farrington and Martin, 1987). Socioeconomic factors—farmers' goals, level of participation in a cash economy, access to markets, available resources and knowledge—are among the reasons why this situation re-mains, but perhaps the principal reason has been the exclusion of poor farmers from the communication processes involved in agricultural technology generation (Chambers, Pacey and Thrupp, 1989).

The frequent task of the practitioner—consultant or researcher—is to identify and adapt technology which is appropriate to the needs and situation of individual farmers located within relatively isolated agro-ecological zones. Typically, isolation and poverty means that published agricultural information on which to base local recommendations is scanty and the time required for travel and thorough investigation is compromised by budgetary and operational constraints. Isolation can exacerbate the gap between the "inside" knowledge of local rural people and the "outside" knowledge of the practitioner[1].

As a consequence, the practitioner must draw heavily from his or her experience and professional training to get the task done. In the 1950s and 1960s the practitioner may have concluded that farmers were ignorant and therefore set up an extension programme based on change agents who aimed to achieve widespread adoption of a recommended technology package (Chambers, 1993). In the 1970s and 1980s, the practitioner may have sought to identify and remove the farm-level constraints, to try to make the environment fit the genotype. Poor farm-

ers were unable to participate without sizeable aid funds for infrastructure (such as irrigation schemes) or research (for example breeding programmes). Farming Systems Research (FSR), by the mid-1980s, had contributed to understanding the complexity of many farming systems and the important role of the farmer within the system. Now, in the 1990s, the practitioner is frequently directed to assess the situation and opportunities in participation with local rural people[2], recognizing that the process which generates the technology is the key activity.

The Practitioner's Task

The focus of the practitioner's task now becomes empowerment of farmers—how to provide local farmers with the means to identify which of many different and sometimes foreign technologies may be useful in the different niches within their farming systems.

On a short FAO mission in 1994 in Sumatra, Indonesia, the task was to appraise small farming systems and to provide appropriate recommendations for their improvement by their owners. The practitioner divided the task into two parts. The first part was the preparation of a long list of agricultural technology or practices applicable to local problems. This long list was termed the "technology options". The second part of the task was the transfer of a participatory method by which individual farmers could develop the skills for improving their farming systems, in collaboration with the rest of their community.

Identification of Problems and Technology Options

The first step for the practitioner was a rapid rural appraisal (defined by Grandstaff et al., 1986, for example) of the region to gain familiarity with the major farm-level problems and to identify existing technology which local farmers employ to ame-

Table 1 – Analysis Factors for FSR

- Soil, climate
- Crop (& animal production data)
- Food & cash needs
- Status of farmer in community
- Stability & security needs
- Motivation to conserve resources
- Other goals of farmer

Adapted from Harwood, 1979.

liorate those problems. Information sources were not limited to the view from the window of a four-wheel drive, but included other forms of direct observation, assessment of indicators (qualitative or quantitative), semi-structured interviewing of rural people, use of resource persons and resource materials.

There are some basic factors to include in a general farming systems analysis (Table 1), but individual areas of analysis may be stressed under the overall aims of the study. In this Sumatran case, the focus was on improving household food security.

A long list of technology options is essential to provide adequate choices appropriate to different problems, and the resources and skills available to different farmers. It is outside the scope of this paper to explain the details of each technology option, but it is necessary to understand the characteristics of the knowledge which comprises them. The best technologies for this purpose are often those with which the farming community has had most experience. These practices are often traditional and are the result of many years of exposure to trial, modification, climatic changes, and outside influences.

The process of communicating the details of proposed technology is made easier through the use of visible examples and any local farmers with knowledge of the techniques. Many of the technologies found in Sumatra are used in other parts of Asia, the South Pacific and elsewhere. The list developed for

Table 2 – Technology Options

- Kitchen garden for continuous food supply
- Soil improvement techniques
- Sloping agricultural land technology
- Cover cropping
- Using wet land (including fish ponds)
- Multiple cropping
- Multi-layer cropping
- Living fences
- Intensive vegetable cropping
- Tree cropping
- Animal husbandry

Adapted from Landon-Lane et al., 1994.

the task was not exhaustive (see Table 2), but provided ways to solve typical problems or concerns faced by small-farming households. For simplicity, many individual practices or techniques were included under a general heading (for example "Soil Improvement" includes use and preparation of compost, green manure crops, animal manure, mulch, etc.), but there are also many linkages between technology options (such as Cover Cropping under Tree Cropping). Chambers (1983) points out that much agricultural knowledge is not fixed or static, but is frequently modified by the farmers who use it. Thus, each technology option is not a recipe, but is a dynamic package of ideas, experiences and principles on which to base discussion of ways to solve a problem (or access an opportunity) identified in the farming system. This is a key concept in participative or on-farm research, and encourages farmer "ownership" of the technological solutions developed.

The Work Team

The work team consisted of the practitioner and the provincial agriculture or regional development official, supported by either a local advisor (such as extension worker,

village head, leading farmer, or women's leader). Each member of the team was chosen for their ability and sometimes status[3], but importantly each member was competent in a portion of the knowledge pathway between "insider" and "outsider". This is the farming systems research approach, the farmer contributing knowledge of his or her own situation and productivity factors, while the practitioner contributes objective information from observations and measurements, plus a familiarity with alternative technologies from other areas (Harwood, 1979).

Working with a Farm Household

In one village, the work team visited many households, the actual number depending on factors such as the homogeneity of farming systems, the size and physical complexity of landholdings and the speed with which the chosen local advisor became adept with the participatory appraisal and planning method. The role of the practitioner was to lead the discussion at the initial household, but eventually to reduce his or her input to the level of observer at households visited later when the adviser was able to take the lead.

At each household, the process ideally involved an adviser, the farmer, his wife[4] and perhaps other local people (such as village head, neighbours, Women's Association member). Each person participated in reaching a group understanding of the family's farming system and their aims, and in formulating a plan of action for improvements. Participation, particularly of both husband and wife, ensured that the action plan and the work it involves was "owned" by the family. Ownership fosters care and pride in carrying out the plan, and implies that the planned changes or improvements are wanted by the family. This is essential to successful implementation of any recommendations made by the adviser. The adviser must therefore stress the nature of a problem before describing at length any solutions. For example, it is unlikely that activities recommended for erosion control will be carried out by a farmer unless he or she understands the severity of the problem and can see its consequences on his or her farm. The method of participatory appraisal and action planning is shown in Table 3, but note that the process is informal and may not lead to appropriate recommendations if participants (especially the farmer or his wife) become shy, feel threatened, inferior, or excluded from the discussion. The advisor should lead, but not dominate the discussion.

The process was carried out as the people walked over the family's landholdings, so that the questions and answers related to physical things (plants and other features) as well as to concepts (such as insufficient labour, food security).

Conclusions

The map-making technique has been used and developed by social anthropologists in particular for some decades. It is important that the map is made for and by the farming household (or the community, whoever are the "owners" of the land and knowledge). Regional trends or similar features may be noticed after the practitioner records a number of maps. This enables the practitioner to prepare a basic map or template which is useful in speeding up the mapping process. Similar features may be the result of government surveying and land titling (such as area of land allocated per family), farming techniques (such as irrigated rice only on floodplains), environmental factors (such as soil type), economic factors (such as local palm oil factory), or social factors (such as living and utility areas close to houses).

Table 3 – Farming System Appraisal and Planning Method

STAGE I: Current Situation — Familiarization with the farming system and the people. The advisor seeks to understand the:

  • development history of the farm
  • resources of the family
  • technical knowledge and skills of the farmer

SURVEY: The Map — The group make a map of the farm, for example by drawing a "mudmap" on the ground with a stick and using stones, leaves and other materials to represent the locations of crops and features. The advisor can help the farmer to copy the map onto paper. The map is a reference, and makes later discussion and conceptualization easier.

STAGE II: Focus Issues — The advisor helps the group to explore a major problem or issue. For example: Food Supply. Does the farming system provide:

  • enough food all year, and keep some in reserve;
  • a nutritious diversity of food types;
  • excess crops for home processing or selling in the market?

STAGE III: Future Situation — The group agree on long-term goals for the family and farming system, such as building a new house, making a fishpond, or concentrating on a low-labour system of crops in the farmer's retirement. In this stage the adviser selects and locates technology options (Table 2) onto the map prepared in Stage I. This stage may actually be made up of a series of consultations with the adviser and other farmers as the farm family learns the technology they require.

In this case in Sumatra, the few preconditions facilitating the speed with which the method was developed and introduced were:

- a few farmers practicing relevant techniques which served as examples to others;
- existence of local institutions such as farmer groups and women's associations, and the tradition of gotong royong (intra-community labour exchange) (Koentjaraningrat, 1967);
- the ability and willingness[5] of the practitioner to draw on multi-disciplinary knowledge and skills; and
- limiting the initial goal to a few key local people achieving confidence with the method[6].

There were also mitigating factors:

- regional and ethnic language barriers, especially with names and uses of plants, technological methods and other indigenous knowledge;
- social disruption, especially in recent relocation settlements; a tendency for central, educated agronomists and government officials to treat farmers' indigenous knowledge with disdain, preferring themselves to talk rather than listen to rural people;
- a time constraint of up to a week in each site.

The time constraint was far from ideal. Tripp (1982) points out that learning from farmers is a piecemeal, fragmented and iterative process requiring repeated interaction between researcher and farmer over an extended period. However, when presented as a "window of opportunity" for learning and participation, the sense of urgency can have a positive effect.

This method is designed for grassroots development and strengthening of rural community institutions. It is easily adapted for tasks in which the technological emphasis may be land management or forestry (such as social forestry projects). The method requires little outside support after the initial empowerment of a few change agents.

If there is a single most important factor in the process, it is the ability of the practitioner to mentally shift from outsider to insider, such as to adopt the viewpoint of the farmer and his family. The extent to which this is achieved will reflect the speed of the appraisal and planning process, the quality and magnitude of improvement of the on-farm situation, and perhaps ultimately, the direction of future rural research and development.

NOTES

1. This concept of rural people's knowledge and outsider's knowledge has been developed by a number of authors but perhaps most fully by Robert Chambers (1983).

2. For example, in methodological notes for the New Zealand-Philippines Social Forestry Project (1987–95), and the CSIRO/AIDAB-Lao Forage for Small holders Project (1995–2000).

3. Status may benefit the process in many ways, for example a leading farmer's practices may be copied by others; the traditional authority of a village head or spiritual leader can provide access to resources or conflict resolution; the women's leader will be better empowered to represent constituent views than the average farmer's wife.

4. It is recognized that both women and men carry out the work of farming. In the sites visited in Sumatra, as in many other parts of South-east Asia, the head of the family ("the farmer") is male unless the husband has died or left the family and village.

5. A specialist may feel his or her status may be compromised by appearing not to be supreme in knowledge, or by crossing disciplinary boundaries, the practitioner may be breaching contract or code of ethics (for example those of FAO and the Australian Association of Agricultural Consultants).

6. This is done in view of the time constraint, and relies on the various path-ways of knowledge diffusion discussed in detail by other authors (for example Van den Ban and Hawkins, 1988).

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CONTACT ADDRESS:

Chris Landon-Lane,
School of Agriculture and Forestry
The University of Melbourne
Parkville 3052
AUSTRALIA

Multi Media Approach in Nutritional Blindness Project: A Case Study of Two VDCs in Gorkha District

Pius R. Mishra

ABSTRACT: The Nutritional Blindness Prevention Project in Bangladesh, a pilot project of the Nutritional Blindness Prevention Project, was started in the two Village Development Committees (VDCs) of Gorkha District, approximately 135km from Kathmandu, Nepal. Emphasis was laid mainly on growing and consuming green and leafy vegetables and yellow fruits which are rich in Vitamin A. Communication approaches included: home visits by women volunteers; video approach; radio approach; school approach; distribution of posters and calendars; seed distributions and kitchen-garden approach. The interim evaluation indicated that though significant majority had realised the need to consume green and leafy vegetables and yellow fruits, they faced difficulties in growing mainly because the lack of irrigation facilities. As a result of the evaluation, the project was able to construct a small irrigation scheme. With the availability of irrigation facilities, there was a marked increase not only in the production but also in the consumption of Vitamin A vegetables and fruits. An important lesson learned through the implementation of the project is that a combination of multi-media approach reinforced by interpersonal communication is perhaps the ideal strategy in disseminating agricultural and health related information in developing countries like Nepal. During the final evaluation, it was found that radio was the most preferred medium. The use of radio needs to be reinforced through interpersonal contacts, employing folk singers or arranging street theatres in promoting and adopting agriculture related information for mass sensitization.

RESUMÉ: Le projet de prévention de la cécité d'origine nutritionnelle au Bangladesh est un projet pilote qui a démarré dans deux Comités de Développement Villageois (CDV) du district de Gorkha, à environ 135 km de Kathmandu, au Népal. L'accent a été mis sur la culture et la consommation de légumes verts à feuilles et des fruits jaunes riches en vitamine A. Les approches de communication comprennent les visites à domicile par des femmes volontaires, la vidéo, la radio, l'école, la distribution de posters et de calendriers; la distribution de semences et l'approche cuisine-jardin. L'évaluation intérimaire indique que bien qu'une grande majorité est consciente de la nécessité de consommer des légumes verts et des fruits jaunes, ils font face à des difficultés de production à cause du manque d'infrastructures d'irrigation. Suite à l'évaluation, le projet a pu construire un plan d'irrigation, ce qui a pu accroître non seulement la production mais aussi la consommation de fruits et légumes riches en vitamine A. Une grande leçon tirée de l'application du projet est que l'association de l'approche multi-média renforcée par la communication interpersonnelle est peut-être la stratégie idéale dans la diffusion de l'information en matière agricole et de santé dans les pays en développement comme le Népal. Lors de l'évaluation finale, on a constaté que la radio était le moyen de communication préféré. Son usage demande à être renforcé par des contacts interpersonnels, par le recours à des chanteurs traditionnels ou des théatres de rue pour promouvoir l'information agricole comme moyen de sensibilisation de la population.

RESUMEN: El Proyecto de Prevención de la Ceguera por Factores Nutricionales en Bangladesh es un proyecto piloto que se inició en dos Comités de Desarrollo de Aldeas del Distrito Gorkha, ubicado aproximadamente 135 km de Kathmandu, Nepal. El Proyecto hizo énfasis en el cultivo y consumo de tanto hortalizas de hojas verdes y frondosas como de frutas amarillas, ambos productos con alto contenido de vitamina A. Los enfoques de comunicación incluyeron: visitas a domicilio por mujeres voluntarias; proyección de videos; mensajes radiales; visitas a escuelas; distribución de carteles y calendarios; distribución de semillas; y el enfoque cocina-huerta. La evaluación a mitad del proyecto indicó que, aunque una mayoría significativa había comprendido la necesidad de consumir frutas amarillas y hortalizas verdes y frondosas, al mismo tiempo tenía dificultad para cultivarlas debido principalmente a la falta de instalaciones de riego. Como resultado de la evaluación, se construyó un proyecto de riego en pequeña escala. Con la disponibilidad de instalaciones de riego, hubo un aumento notorio no sólo en la producción de hortalizas y frutas que contenían vitamina A, sino también en el consumo de las mismas. Una lección importante que se aprendió durante la implementación de este proyecto fue que una combinación de enfoque multimedio, reforzado con la comunicación interpersonal, es, quizás, la estrategia ideal para difundir información sobre agricultura y salud en los países en desarrollo como Nepal. Durante la evaluación final, se encontró que la radio era el medio preferido. Por tanto, hay que reforzar el uso de la radio a través del contacto interpersonal, el empleo de cantantes populares o la organización de teatros callejeros que promuevan y adapten la información relacionada con la agricultura para lograr una sensibilización masiva.

Eye problems are quite common in Nepal and Vitamin A deficiency is a major contributor to blindness from xeropthalmia. This situation is mainly due to the lack of proper information. According to a 1981 national survey, xerophthalmia is a significant public health problem in Nepal with a prevalence rate of 3.12 percent in the hills and 3.02 percent

at the national level. The Food and Agriculture Organization (FAO) reported that Nepal falls within the significant Vitamin A deficiency public health problem countries in the world. (FAO, 1988).

Documents and available statistics show that Gorkha District was among the districts that have a significant level of xerophthalmia cases. Nutritional Blindness at the time of project intervention stood at 1.7 percent. (Worldview, 1990).

With this background as well as the success of Nutritional Blindness Prevention Project in Bangladesh, the Worldview International Foundation Nepal took the initiative to implement a Nutritional Blindness Prevention Project (NBPP) on a pilot scale in two Village Development Committees[1] (VDCs) of Gorkha District, namely Mirkot and Khoplang.

Though this pilot project had several objectives, only the objectives relevant to this paper are mentioned, and they include:

- To increase the level of awareness of the targeted groups about the causes of nutritional blindness.

- To educate and motivate at least 70 percent of the target population not only to grow Vitamin A rich vegetables but also to consume what they grow.

- To motivate targeted population to grow and consume yellow fruits such as papaya, mango, banana, and so forth covering the two VDCs.

The project covered 2130 households spread over in mid-hills for a total population of approximately 12,000 (Worldview, 1990).

Methodology

As the effort of this project was mainly on prevention of night blindness, much emphasis was laid on motivating the beneficiaries to grow and consume green and leafy vegetables and yellow fruits which are rich in Vitamin A. In order to motivate the beneficiaries, both interpersonal mode of communication as well as mass media were employed. These included: Women volunteers approach; video approach; radio approach; school approach; folk singers approach; and training and workshops.

Women Volunteers (WV) approach: Some 14 local women were recruited by the project. In each ward of the VDC, one woman volunteer was assigned the responsibility of making home visits and conducting educational and training programs for mothers of the villages periodically. WVs were very effective in communicating project messages, informing and distributing posters and calendars and reiterating the importance of growing and consuming Vitamin A rich vegetables and fruits. Immediately after recruitment, 14 WVs were provided training on interpersonal communication skills as well as general information on nutrition, cooking methods, childhood disease and its prevention. In order to facilitate effective communication, each women volunteer was provided with one cassette recorder with a few cassettes and a flip chart.

Video approach: As the target population were mostly illiterate, print medium would hardly have been an effective means of communication. But audio visuals like video films could easily be understood by the local people as it easily transcends the barrier of illiteracy. The audio visual medium has been found to be very effective for illiterate and rural audiences in Nepal. (Gorkhapatra, 1990). Thus the video approach was introduced. During the project period of three years 349 shows were organised with an estimated audience of 40,000 people (Worldview, 1994).

Radio approach: With the same consideration as above, two radio spots of one minute and 30 seconds were aired by Radio Nepal, the only radio station in the Kingdom.

School approach: After discussions with the District Education Officer of Gorkha, two high schools and four primary schools were selected. Teachers of the selected schools were provided with periodic training and supplied with information, education and communication materials (IEC). The trained teachers were entrusted with the responsibility of taking additional classes on nutrition education also. Furthermore, they were encouraged to grow Vitamin A rich vegetables in the school compound which were treated as demonstration gardens. Both the local people and the schools showed much interest in the program. This approach incorporated colloquies and debates a unique feature which generated and sustained the interest of the students. The introduction of colloquies and debates on the messages of the program solicited the participation of large number of students. The winners of the programs were given small packets of seeds of Vitamin A rich vegetables, writing-pads and pencils. Altogether 114 debates and colloquies were organised in selected schools with the result that 1032 students began the preparation of the home gardens during the project period. (Worldview, 1994).

Folk singer's approach: A group of folk singers used to visit and render musical programs on the prevention of nutritional blindness in a cluster of homes. In Nepalese culture folk singers have a deep rooted tradition of conveying messages through songs and music. Prior to their appointment, the folk singers were provided with orientation training. The project employed three folk singers to disseminate messages on ways to prevent night blindness. Though this approach was very popular, ensuring the regularity of the folk singers was a constant problem to the project authorities. Thus, this approach was reluctantly dropped during the program.

Training and Workshops: Motivation and education of the target beneficiaries was an important consideration that the project personnel had to bear in mind. Thus the project provided the training programs/workshops on the following: orientation training to women volunteers; Mothers Group Formation Training; Local Leaders Training; Women Volunteers Refresher Training; and Training for School Teachers.

Results and Discussions

The effectiveness of interpersonal communication is evidenced by the fact that a large majority became knowledgeable about night blindness through women volunteers home visits. Attempt to disseminate information through folk singers seems to have been quite effective. School approach also contributed its fair share in providing knowledge to parents and guardians. While face to face interaction was the most prominent source of knowledge regarding night blindness, different medium of mass media were also disseminating information.

The response regarding posters and calendars was surprising as a total of 3000 posters and calendars were printed and distributed in the project area. The low response however could be attributed to the low literacy of level, the temporariness of posters and calendars in the sense

Table 1 – Sources of Knowledge Regarding Night Blindness*

Sources	Frequency	Percent N = 120
Women Volunteers	97	80.83
Folk Singers	74	61.66
Colloquies & debates	53	44.16
Video	47	39.16
Radio	31	25.83
Posters	23	19.16
Calendars	18	15.00
Training	14	11.66
Flip Charts	8	6.66

*The percentage adds up to more than 100 because of multiple response.
(Source, Worldview, 1992)

Table 2 – Most Preferred Source of Communication Regarding Night Blindness

Source of Communication	Male	Female
Women volunteers	5.0	50.0
Video	43.33	21.66
Folk Singers	30.0	20.0
Radio	13.33	5.0
Training / Workshop	8.33	3.33

(Source, Worldview, 1993)

that they were torn or blown by the wind. Some considered it to be precious and were found to have stored them in their attic or locked in their trunks.

The low response regarding flip charts is quite understandable as only 200 were produced and distributed. Besides women volunteers, only a few had received it.

Table 2 provides an accurate reflection of the frame of the rural audience on the ways they prefer to acquire information. Half of the female respondents preferred women volunteers mainly because interaction with them was quite easy and these women volunteers could easily explain to them the causes, consequences and corrective measures regarding the disease. Besides being from their locality, there was frequent contact between women volunteers and the community members.

The project strategy to employ a mobile video team appears to be quite popular. While it was rated as the most preferred medium by males, females also gave this medium a second best rating. Video shows in the project area are rare and generate a lot of interest and attraction.

While males gave a second best rating to folk singers approach, females rated this approach almost on par with video shows. This accurately reflects the tendency of the rural populace to seek entertainment from the folks singer specially in the remote areas.

It was indeed surprising that none of the respondents showed their preference for posters, calendars and flip charts. The low level of literacy alone can not explain such response. A separate evaluation on the messages, pictures, letter size and so forth needs to be done before coming up with some conclusion regarding the dissemination of information through print medium.

It is evident from the above table that there has been a significant decline in the incidence of night blindness in the project area after the project intervention. This reduction could be attributed to a well thought out communication strategy. The

importance of proper dissemination of agricultural information through various channels has been further evidenced in "Income Generating Project for Women Farmers (IGP-WF) along Dharan Basantpur Highway" undertaken by the Center for Environmental and Agricultural Policy Research, Extension and Development.

Prior to CEAPRED's intervention, neighbours and other farmers were the main source of agricultural information. This again emphasizes the value of interpersonal communication. Once CEAPRED started its project activities, the tendency to rely on neighbours and other farmers gradually declined. In providing agricultural information, CEAPRED also employed interpersonal approach and worked through groups providing regular practical trainings on the field, distributing some print, materials, as well as using audio-cassettes. The overall objective of the IGPWF was to generate additional income within the range of Rs. 10,000 to Rs. 15,000 in 1000 to 1500 households.

Table 5 provides the efforts of CEAPRED in generating additional income which has contributed in the alleviation of poverty. CEAPRED's effort in disseminating agricultural information effectively along with technical assistance resulted in increased area under vegetables, increased consumption and increased income.

From the earlier discussion, the following points have emerged. Motivation is a key element in development communication. It has been a general experience that the success of communication program depends no less on the amount of information as on motivating people to want to act on the information. This is particularly true of the unsophisticated rural audience whom the development communication primarily aims to serve. (Quebral, 1988)

As a communication strategy, employing local women volunteers appeared to be an effective interpersonal communication strategy for motivating the community to pre-

Table 3 – Incidence of Night Blindness During the Project Period

Year	Number of Cases
1991	214
1992	97
1993	22

(Source, Worldview, 1993)

Table 4 – Sources of Agricultural Information Institution*

Institution	Pre-Project	First Year	N = 113 Second Year
Agriculture District Office	8.0	14.3	16.7
Pakhribas Agriculture Centre	16.0	0.9	8.4
Koshi Hills Seeds and Vegetables Project	8.9	3.6	8.3
Neighbors and other Farmers	98.3	21.4	16.7
CEAPRED	—	100	100

*The percentage adds up to more than 100 because of multiple response.
(Source, CEAPRED)

vent night blindness and increasing income. Since they are from the same locality, they are quite knowledgeable about culture, attitude and sentiments of the people. To a great extent, the role of women volunteers in dealing effectively with the people in various VDCs was instrumental in the decline of cases of night blindness as well as increasing the income of the people through off-season vegetables in the eastern districts of Nepal.

Video films on prevention of nutritional blindness and other related health areas were very effective in raising awareness of the target group. But as the area is in the middle hill region, tremendous difficulties had to be encountered mainly due to the steep slopes in hauling the video equipment to screening locations. Considering the popularity of the video films, this approach was continued till the end of the project period. It is felt that though costly in terms of production it is an effective medium for educating the rural audience.

Radio spots were heard not only in the district but also in the entire kingdom. Transmitted during prime time, these spots were helpful in popularizing Worldview International Foundation as well as educating people on ways to prevent night blindness.

The unique feature of school approach was that it sought the active participation of the community concerned. Once the community began to perceive the benefits, the number of people growing green leafy vegetables and yellow fruits began to increase.

Folk singer's approach indicates the potential of the folk media in development communication. Experience in Gorkha suggests that people

are very receptive when this media is employed as they feel it is their own and not imposed.

The interim evaluation pointed out that though significant majority had realised the need to consume green leafy vegetables and yellow fruits, they faced difficulties in growing mainly due to lack of irrigation facilities (Worldview, 1992). Thus implementation of this project once again reinforces the necessity of the systems approach to development. This is in recognition of repeated observations that communication does not by itself result in development effects but is an input that must be used together with many non-communication factors, particularly the technological and institutional services to, bring about development. Development communicators therefore must consider not only the communication inputs to development but also the complementary inputs that enhance the realization of the intended results. (Jamias, 1975)

In order to really motivate people to grow and consume leafy and green vegetables and yellow fruits, a small irrigation scheme was constructed which enabled the local people to grow and consume Vitamin A rich vegetables and fruits.

Lessons Learned

Some important lessons have been learned in these meaningful developmental endeavours. The strategy of employing community based women volunteers is an effective interpersonal approach. While NBPP employed women volunteers, three female extension workers were hired by IGPWF. In both cases, rapport was easily established and information exchange was smooth.

As a communication strategy, video approach employed by NBPP proved that moving image can be harnessed for educative purposes, besides the entertainment purpose. Moreover, in remote areas of Mirkot and Khoplang VDCs of Gorkha District, the medium itself generates lots of interest though the danger of medium becoming the message also exists. On the other hand, the choice of the content of the messages must be so designed that the intended audience fully understands, internalizes and then adopts the messages in the video films. In promoting development communication activities, the importance of utilizing the folk media has been reiterated during the project implementation.

Training as a strategy is effective

Table 5 – Comparison of estimated area under vegetables, incomes and vegetable consumption per household before and after the project implementation

	Pre-Project	First Year	Second Year
Area under vegetables (ha)	0.11	0.22	0.30
Gross Income (Rs)	2,480	12,850	17,500
Annual consumption (Kg)	392	427	513

(Source, CEAPRED)

in any developmental endeavours. Training programs should be mainly participatory so that two way effective communication is established. Experience of IGPWF suggest that people participate actively in those training programs which have direct bearing on their lives either in the area of health or income generation.

Important as communication is in advancing development, other inputs and support are equally necessary for developmental effort to succeed. The construction of a small irrigation scheme in NBPP distribution of inputs, renting out collection centers and provision of truck in IGPWF are cases in point.

To sum up, the important lesson learned through the implementation of this project is that a combination of multi-media approach reinforced by interpersonal communication is the ideal strategy in disseminating agricultural and health related information in developing countries like Nepal.

Concluding Remarks

While selecting on the medium in disseminating information in remote areas in a country like Nepal, it is recommended that more effort should be made to utilize radio though it is neither the primary source of information nor the most preferred source. This is the only medium which is within the reach of the common people. Furthermore, the production of radio spots and programs are relatively cheaper compared to video not to mention its ability to transcend the barriers of illiteracy.

The success of tapping folk singers in disseminating messages underscores the fact that cultural habits need to be given due consideration. A certain amount of flexibility by the project authorities is required in dealing with such people. A well devised plan has to be thought out in advance so that their services can be effectively employed. The services of folk singers can be used for not only educational purposes but also

for entertainment purposes. By now, it has been well established that effectiveness of the messages tend to be more when there is a fine blend of education with entertainment.

From the experience of Gorkha District, it is evident that mobile video units are not a practical idea in the mid-hills of Nepal. It is recommended that a venue be selected which could serve as a community viewing hall. Information regarding the screening of the videos must be disseminated in strategic places with advance notice.

Nepalese society is a very oral society where the word of mouth plays an important role in information exchange. People are the best channel for communicating important messages in rural areas. Efforts have to be made, during the course of devising a communication strategy, to actively seek a community's participation which would be instrumental in determining the success of the program.

Experiences of both NBPP and IGPWF suggest that agricultural information is an important developmental input especially in remote areas of Nepal. Being an agricultural country, an effective mechanism must be developed for its proper dissemination, which has to include a combination of interpersonal communication and mass media. In order to maximize the value of agricultural information, other developmental inputs also have to be provided.

Based on all of the above, it is evident that developing countries like Nepal should make concerted effort to prepare more radio programs as a medium of mass communication in disseminating agricultural information. However, these need to be reinforced through interpersonal contact and utilizing folk media (folk singers, street) in promoting agriculture related information for mass sensitization. Finally, it must be mentioned that employing interpersonal mode of communication with a combination of multi-media approach would be relevant in remote areas.

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PIUS R. MISHRA is the Director of the Center for Environmental and Agricultural Policy Research and Development (CEAPRED) in Kathmandu, Nepal.

CONTACT ADDRESS

Pius R. Mishra
Center for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED)
GPO Box 5752
Kathmandu, Nepal
Telephone: +91-527040
Fax: +91-977-1-220143

Provision of Information to the Rural Communities in China

Qiaoqiao Zhang and Xiaolan Cheng

ABSTRACT: Efficient information dissemination and services for the rural communities in China will rely largely on the introduction of effective channels of communication and modern information technology. This technology should include live demonstrations of plots or farms experimenting with new techniques and varieties, audio-, visual- and satellite-transmitted information, multimedia, interactive and expert information systems, and on the proactive provision of targeted, specialised and digested information via consultancy and question-answer services. The high priority given by the Government to sustainable agriculture and the rapidly improving price/performance of electronic publishing and telecommunications in China should encourage such efficient information dissemination and services to rural communities.

RESUMÉ: La diffusion d'informations et de services efficaces aux communuatés rurales chinoises reposera largement sur l'introduction de voies de communication effectives et d'informations technologiques modernes. Cette technologie devrait inclure des démonstrations en direct de fermes utilisant de nouvelles techniques et variétés, des informations audio-visuelles transmises par satellite, des multimédias, des systèmes d'information interactifs et spécialisés, et une fourniture active d'information ciblée, spécialisée et résumée via des consultants et des services questions-réponses. La priorité donnée par le gouvernement à l'agriculture durable et l'amélioration croissante des prix et des performances de la publication électronique et des télécommunications en Chine devrait encourager de bons services de diffusion en matière agricole en faveur des communautés rurales.

RESUMEN: La eficiencia de los servicios de difusión de información para las comunidades rurales en China dependerá, en su mayor parte, de la introducción de canales efectivos de comunicación y de tecnología moderna de información. Esta tecnología debe incluir demostraciones en vivo de parcelas o fincas que experimentan con nuevas técnicas y variedades; transmisión de información por medios auditivos y visuales, y por satélite; uso de sistemas de información multimedios, interactivos y expertos; y suministro dinámico de información especializada y compilada a una audiencia definida mediante servicios de consulta y de pregunta-respuesta. La alta prioridad que el Gobierno de China asigna a la agricultura sostenible, así como los precios más favorables y los avances en la publicación en medio electrónico y en telecomunicaciones de ese país, deben servir de incentivo para que la difusión de la información y los servicios correspondientes para las comunidades rurales se realicen en forma eficiente.

Background

China has a total land area of 9.6 million km^2, accounting for 1/15 of the total land area of the Earth. The population of the country is 1.16 billion, according to a latest census. The Chinese government has a responsibility of feeding around 1/5 of the planet's population given 1/15 of the Earth's land surface. Over 70% of the population are rural, and only 10% of the total area is arable and 66% consists of mountains. To the Chinese, agriculture is a subject of major interest and continuing concern.

Over recent years, China has had one of the fastest growing economies in the world: in 1993, economic growth reached 13 per cent. Much of this growth performance is the direct product of the economic reforms over the fifteen years since 1979 when China also initiated new policies of opening up to the outside world.

The reform process has been remarkably successful. It consists of six main components: the introduction of private farming under the 'household responsibility' system; encouraging private business; restructuring public enterprises; promoting foreign trade; policies to stimulate external financing; and decentralising administration to the provincial and local level. The reform of the rural economy came first and was launched in 1983. Following this reform, great changes have taken place in rural areas; the earlier large-scale communes have been broken up into smaller units based on households or families. The smaller production units were stimulated by the possibility of making profits, although part of their staple produce has to be sold to the State at a fixed price. Price control of the majority of farm products was liberalised and this enabled the agricultural sector to develop rapidly in the direction of specialisation and commercialisation. Aggregate output increased. These changes have brought about an immense diversification of the rural economy.

However, as a developing country, China is constrained by certain unfavourable conditions-natural, historical and political, which have led to the following consequences:

• hundreds of millions of Chinese farmers are still engaged in subsistence agriculture;

• traditional means of production still dominate, so that the productivity in agriculture is rather low;

• a large proportion of the total population in rural areas is semi-literate or illiterate;

- in some rural areas, the economy is still underdeveloped;
- agricultural education and training are not adequate; and
- there exists a shortage of qualified personnel in agricultural science and technology.

These factors have hindered the further development of agriculture. One of China's strategies in addressing these problems is adopting sound agricultural policies, with the application of advanced science and technology to agriculture, coupled with adequate physical inputs. In 1986, the Chinese Government launched 'Spark Programme'. This programme has focused on "spreading R&D findings to the broad rural areas to lead 800 million Chinese farmers developing agriculture, and township enterprises on the basis of science and technology, promoting the development of a planned, socialist, R&D-supported commodity economy in the countryside, and quickening the modernisation of agriculture." This programme has attracted support from the United Nations Development Programme, the World Bank, European Union and many foreign governments. Sound information is a prerequisite for implementation of the policies of applying advanced science and technology to Chinese agriculture. Information plays and will continue to play, a vital role in agriculture from production to marketing to consumption of agricultural products.

Overview of the Information Systems for the Rural Communities of China

The emergence of specialised households and family unit production patterns, and the adoption of an output-related system of contractual responsibility have led to a rapidly increased demand for a wide range of agricultural information by research and extension personnel and farmers. Their information needs now include not only scientific and technological information but also practical and marketing information. Further, the development of village and township enterprises has raised demand for both agriculturally and industrially related information.

The development of agriculture, and the reform of the rural economy have also highlighted the inadequate performance of existing agricultural library and information systems. These systems share many common problems with other developing countries. Among the major problems are poor access to information resources, especially international information resources; a lack of modern information technology and underdeveloped telecommunication systems; the backwardness of the information industry; and low utilisation of information resources.

For many remote rural areas, these problems are more severe. The key problem is that there is a big gap between what rural users need and what services are available to them, since the relatively better stocked libraries and information services in research and training institutions are too remote from these rural communities to be accessible; libraries and reading rooms at county and village levels are inadequately stocked with relevant materials; there is widespread ignorance of technical and practical information that could be accessed; there is a lack of systematically organised surveys on rural user information needs; there is the problem of physical isolation caused by dispersed distribution of rural households, and poor telecommunication and transportation infrastructure. The above problems impede the development of rural library and information services. It is vitally important to improve the agricultural information systems in rural areas so that they can perform their role effectively and can meet the information needs of all user groups.

The characteristics of information systems for rural communities of China are here described and discussed in terms of services provided, providers of these services, users and their information needs, and the present state of use of information and telecommunications technologies in rural areas.

Information Services to Rural Communities and Their Providers – In China, information services provided to rural communities include conventional information services, technology development services, and technical training services. These services are usually provided by the rural library and information services directly to the rural users. There are some indirect services which are usually provided by public libraries or academic library and information services at a high level through social services, societies and mass media in the rural areas. Here we focus on the direct services.

Conventional information services usually provide rural users with information on agricultural science and technology, rural economic development, business opportunities and market potential. In some rural areas of China, the following types of services are provided free or on a fee basis:

- information retrieval services;
- reporting information through meetings, seminars, demonstrations, and technical newsletters;
- visual-, audio- information by broadcasting programmes, video, film and slide shows;
- information consultancy services;
- targeted and specialised information services;
- information research and analysis; and
- exhibitions and displays of agro-products.

Technical development services provided include:

- establishing pilot programmes to demonstrate the exploitation and utilisation of scientific and technical information in rural communities;

- introduction of technologies to targeted farmers (Information-Technology-Production); and
- information provision to farmers throughout the whole process of production and sales (Information-Technology-Production-Information-Sales).

Technical training services include providing on the spot or extension training or training courses, and compiling training materials in printed or audio-visual forms.

Not all rural areas of course have the advantage of all the above services, in particular the mountainous areas.

The providers of both direct and indirect information services to the Chinese rural communities could be categorised as follows (in broad order of accessibility):
- Village reading rooms;
- Extension centres or stations;
- Rural information services;
- County public libraries;
- County government departments;
- County agricultural and related research centres;
- Libraries/information centres in research and training institutions at higher levels;
- Mass Media (radio stations, newspaper agencies, and film studios etc.);
- Information Brokers/Independent Consultants; and
- Publishing Houses.

Users of Information in the Rural Communities of China and Their Information Needs – In China, the users of information in the rural communities are conventionally divided into four main groups: administrators or decision-makers of local governments and state farms; technical personnel engaged in agricultural production and township enterprises; extension workers; and farmers of state farms and household farms, and workers at township enterprises.

The rural population in China comprises over 70% of the total

Table 1 – Potential User Groups in Rural Communities of China

User Group	Number of Users
Administrators/Decision-makers	Not available
Farmers	430.9 million
Farmers and Technical Personnel at State Farms	8.3 million
Extension Workers	0.7 million
Village and Township Enterprises Workers	96.1 million

population. They are potential beneficiary users to the improved information services. We can see the magnitude of the efforts needed to meet the information needs of rural users. Table 1. gives a breakdown of (potential) users groups the rural communities of China:

The information needs of these different groups vary in terms of types, quantity, timeliness and medium of information, channels of communications and methods of information dissemination etc. It is important to analyse the characteristics of information needs of all the user groups, if we are to provide information effectively for them.

Administrators/Decision-makers – Sound decision making depends on sound information. This group is involved in the process of decision and policy making as well as daily administration in the rural areas. For their work, they usually require information on government policies regarding agricultural production, extension and marketing and so forth. They also need comprehensive and digested information on the development of science and technology. They obtain information mainly via formal administrative or mass media channels or from the feedback from surveys they conduct.

Technical Personnel – Technical personnel who are directly engaged in agricultural production usually work for the agricultural departments of county or district governments. Most of them are graduates of universities or agricultural schools. They are the technical leaders in the process of agricultural production,

so have important roles in the following areas: ensuring the smooth running of agricultural production and solving technical problems whenever they occur; carrying out innovation and technical improvement in order to improve productivity and efficiency; introducing and interpreting new technologies, methods and equipment for agricultural production and farming management, and instructing farmers in implementation.

Therefore they require reliable, accurate, practical, technical and detailed information; timely provision of information in order to solve technical problems; and targeted and specific information. They usually obtain information from formal information services but also pay attention to informal channels of communication, such as meetings and personal correspondence.

Farmers – Farmers are directly engaged in agricultural production including crop production, animal husbandry, fishery and forestry production etc. Adult literacy in this group is improving; many young farmers have been educated to secondary school level. Many farmers, in particular young educated farmers, now believe that science and technology are the keys to the door of wealth and prosperity. They are keen to improve the yield and quality of the agricultural products and thus require practical information on: desirable varieties with high yield, high quality and high resistance to diseases, pests and bad weather; highly efficient fertilisers and pesticides; improved techniques and methods of cultivation and plant

protection; modern machinery and tools for labour saving; the processing, storage and sale of new agro-industrial products and so forth; market price and sale trend of agricultural products; and cultivation methods of cash crops.

The main sources of the above information they rely on are usually newspapers, popular magazines and extension workers and personal correspondence directly with researchers and of course from other farmers. They require comprehensive information services which will provide them with current, timely and highly specific information.

Extension Workers – Agricultural technological extension centres and stations are organisations which play important roles in the transfer of technology. China has an extensive extension system with 5 levels—national, provincial, prefectural, county and township. Administratively, these extension centres and stations are under the respective governmental administration bodies, but they transfer the research achievements from research and education, and therefore are closely related to agricultural research, education and production.

Extension effectively becomes operative at the county level, which has been designed as the focal point for developing China's agricultural technology transfer. A high proportion of the staff in these stations are technical personnel, who are either university graduates or agricultural school graduates or trained technicians. Depending on the nature of the tasks they perform, they need not only practical instruction and technical information but also some academic information in order to improve their understanding of the new technologies. It is noteworthy that they actually perform the roles of technological gatekeepers. It is they who have to understand more about the technologies introduced, and then to instruct the farmers. This involves technology transfer, adaptive research and information dissemination.

Technical Personnel and Workers in Township and Village Enterprise – Since the reform of the rural economy, township and village enterprises have emerged and developed rapidly. They are mainly agro-industry oriented; some have been set up privately and some collectively. They have become an important mainstay of the rural economy. These enterprises urgently need technical personnel and relevant information. The information they need is more technical, industrial and marketing oriented. They need information on: new products development; development and introduction of new technologies; and marketing and sales.

They require information in the forms of national quality standards, factual data and display and exhibitions of products, equipment and machinery. The channels from which they obtain information are mainly through social activities, feedback from other users and newspapers. They welcome the provision of proactive consultancy services, and the introduction of information sources and training.

Present State of Information Technology and Telecommunications in the Rural Areas of China – The uses of information technology have become more widespread in China over recent years. The rapid improvement in the availability and performance of computers has allowed many organisations or even individuals to be equipped with PC's.

The telecommunications industry in China has advanced very rapidly with a 50% increase in output in the year 1992. The demand for modern equipment such as microwave digital switch boards, fibre-optic links, mobile telephone systems is rising. The objective of the Government is that China will have a modern and efficient telecommunication system based on the latest technology by the year 2000. The national satellite communication system is beginning to take shape and now includes 5 earth stations and 35 thousand surface receiving stations. Direct communication with more than 50 nations is possible through this system.

However, new technologies and infrastructures for advanced communications are likely to be introduced initially in major cities and industrial areas. Rural areas will need comparable information technology, telecommunications and broadcasting infrastructures to those of urban centres if they are to develop a more balanced economic activity with diversity of employment. It can be argued that rural areas need a high priority.

If we compare the telephone situation between urban and rural areas of China, we can see that although there has been a great increase in overall usage, rural areas still lag behind (Table 2.)

Possible Future Development

Experience suggests that the most successful agricultural applications are those which help decision makers in solving complex problems. Information systems will find broader use in agriculture as new factors

Table 2 – Number of Telephones in Urban and Rural Areas of China

Year	No. of Telephones in Urban Areas (10^4 household)	No. of Telephones in Rural Areas (10^4 household)
1965	77.11	49.22
1975	103.28	65.95
1985	218.96	83.07
1991	670.83	174.23
1992	920.57	226.34

will generate additional demands for them. An effective information system for the rural communities calls for the development of sound information policies coupled with efficient dissemination of rural information and services. Efficient information dissemination and services for the rural communities will rely largely on the improvement of the existing information mechanism, on the proactive provision of targeted, specialised and digested information via consultancy and question-answer services, and on the introduction of effective channels of communication and modern information technology, such as plot or farm demonstrations experimenting with new techniques and varieties, audio, visual, and satellite transmitted information, multimedia, interactive and expert information systems. The high priority given by the Government to sustainable agriculture and the rapidly improving price and performance of electronic publishing and telecommunications in China should encourage such efficient information dissemination and services to the rural communities.

When devising policies and programmes of information provision to rural communities, the following factors need to be borne in mind:

- geographic and seasonal characteristic of agricultural production;
- geographic isolation of some rural areas;
- old traditions existing in the rural areas;
- proportion of literacy and receptivity to information;
- economic capacity; and
- present information services to rural areas.

Information provision to rural communities in China can be greatly strengthened by providing proactive services, introduction of modern information technologies and establishment of provincial agricultural information networks.

Proactive Services: Improving the Existing Information Mechanism and Provision of Targeted, Spe-

cialised and Digested Information to Rural Communities of China – In the light of the nature of agricultural production, and characteristics of rural users and their needs, efforts should be made to improve the existing information provision by providing proactive services to the rural communities of China. The following measures are recommended by the authors:

Local government:
- Modernisation of rural/agricultural information systems.
- Strengthening agricultural extension systems.
- Promoting training activities (for decision makers, extension workers, farmers and so forth.
- Setting up more reading rooms in the farms or villages, which will be stocked with technical know-how materials (including some picture-based printed materials).
- Regularly organising mobile libraries, which can be stocked with books from county public libraries and agricultural libraries at higher levels.

Agricultural library and information services:
- Assessing the information needs of some key households or specialised farms and providing targeted SDI services.
- Compiling agricultural information newsletters, broadcasting and video programmes to introduce new varieties, new technologies and new policies.
- Delivering technical and practical information, free of charge, directly to extension stations and farmers.
- Organising meetings and demonstrations for disseminating specialised technical information.
- Organising teams of information specialists to visit farms and to provide consultancy and question-answer services.
- Maintaining liaison with local technical departments and media organisations.

- Providing regular support to the regional radio stations in farm broadcasting programmes.
- Organising farmers' groups in the form of radio clubs in rural areas.
- Coordinating all the concerned technical departments in organising farmers rallies and exhibitions.
- Organising technical film shows in collaboration with extension stations.
- Collecting information generated from farmers and local organisations, and sending them to higher level authorities and information services in order to enhance two-way information flow.
- Supporting the publication of more practical and technical books to reach the critical mass and to meet the information needs of farmers.

Improving the efficiency of information provision to the rural communities calls for strengthening of existing information services in those rural areas which lack such services. These information services could be established in conjunction with local extension stations or in collaboration with county public libraries, mass media and local associations for science and technology. The priorities for the local agricultural information services are proposed as follows:

- Promoting the dissemination of agricultural research results and enhancing technology transfer (According to statistics, each year, only 60 to 70% of results of the Chinese agricultural research community are actually applied in the rural communities).
- Promoting the popularisation of scientific and technological knowledge and helping to improve farmers' literacy and receptivity to information.
- Urging the Government to invest more in modern information technologies and telecommunications in rural areas thus ensuring more effective information provision, dissemination and technology transfer.

Introduction of Modern Information and Telecommunication Technologies – Appropriate information and communication technologies can reduce the isolation of rural areas. These technologies facilitate communications and the processing of information, and as a result, the economic constraints associated with geographical isolation can become less significant, and the cycle of economic decline in many rural areas can be broken. It is essential that the right decisions are taken on the choice of technologies and system configurations. The degree to which rural areas will be integrated into the Socio-Economic and cultural life of urban China in the 21st Century depends on decisions that need to be taken in the 1990s.

Learning from the experiences of developed and some developing nations, the authors can at least recommend the following information and telecommunications technologies to be introduced to China's rural areas:

- telephone networks

- satellite technologies

- CD-ROM, multimedia, interactive and expert systems

- FAX

- Regional Cable TV

- Personal Computers and PC communications (including E-mail, electronic network)

- Video, Broadcasting and Videotext.

The above technologies can help reduce the isolation in rural areas and facilitate the provision and dissemination of information to rural communities.

Telephones may be common in the rural areas in the developed countries but it is not true in many developing countries. In China, there is an urgent need for developing telephone networks in the rural areas, especially in those remote mountainous areas. The telephone network can reduce the physical isolation and enable timely information transfer. Satellites can be used for all kinds of telecommunications services, among them information transfer. The national satellite communication system of China should be extended to more of the rural areas to facilitate information transfer to the rural communities.

CD-ROM and multimedia are practical and suitable media for provision and dissemination of information in the rural areas. Their non-reliance on telecommunications opens up the possibility of providing electronic information to the large number of potential database searchers who have been denied access, through financial or technical restrictions. In particular, multimedia databases could provide rural users with information in the form of sound, picture and text, which are easier for rural users to absorb.

Because of its features, such as high comprehensiveness of information transmission, high information density, and so forth. Cable TV has recently been used widely as a new type of regional medium. In China, TVs are becoming fairly common in the rural areas and Cable TV networks are now widespread in the urban areas, so it is feasible to establish rural local Cable TV network in at least the coastal provinces, which will provide rural users with education and training services, and targeted information services in audio-visual form.

Video is becoming a common medium for transmitting information to the rural areas, in particular those in coastal provinces; it is regarded as an effective medium for information transfer, education and training. Production of tailor made and practical video programmes for rural users, in particular working farmers, should be the priorities.

It is however realised that introduction of new information and communications infrastructure and services in rural areas will be a gradual process, the investments required will be large, and the systems installed will have to have a lifetime of several decades.

Figure 1 – Structure of Provincial Agricultural Information Network
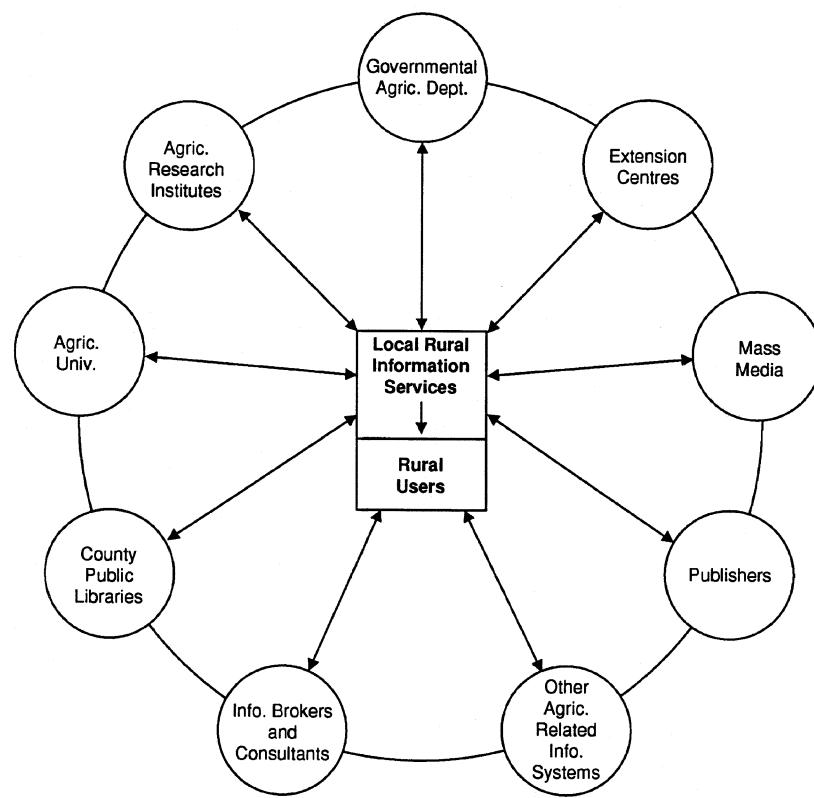
**Establishment of Provincial Agri-
cultural Information Network** –
National and provincial agricultural
libraries and information centres
have and will continue to have an
important role to play in information
provision to the rural communities
of China. If the aim is a long term
and stable development of agricul-
tural economy based on the applica-
tion of science and technology, this
implies the establishment of agricul-
tural information networks catering
for information needs of all user
groups including rural communities.

The establishment of coordinated
provincial agricultural information
networks is therefore proposed.
These provincial networks will be
backed up by the national agricul-
tural information system, in terms
of the access to information re-
sources, and training and consultan-
cy services. These networks will
also cooperate and exchange infor-
mation between each other. The
structure of a provincial network, in
terms of information flow is pro-
posed in Figure. 1.

Such a network will include li-
braries and information centres in
all agricultural and related organisa-
tions and other information services
(including all the information pro-
viders to the rural communities).
Apart from cooperation and re-
source sharing between the nodes,
one of main functions of the net-
work is to provide rural users in dif-
ferent geographical locations within
the province with comprehensive,
timely, and cost effective informa-
tion services, such as question-an-
swer services and tailor made in-
formation services to target users.
These services can be provided
through the local rural information
services or directly to the end rural
users.

A coordinating body of the net-
work should be set up and should
comprise the major agricultural li-
braries and information centres in
the province, such as libraries and
information centres of provincial
academies of agricultural sciences
and of agricultural universities.

Figure 1 – Composition of an Integrated Agricultural Information System

Figure 1 – Composition of an Integrated Agricultural Information System
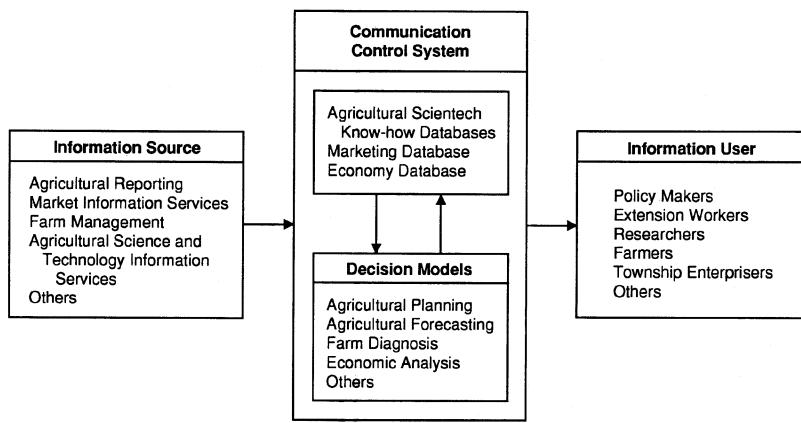
These agricultural libraries and
information centres should take a
lead in establishing such a network
and in convincing the provincial
governments to give some financial
support to the proposed network ac-
tivities and services, in particular to
those related to rural users.

Within the network, an integrated
agricultural information system will
be constructed (Figure 2). The sys-
tem will combine various informa-
tion systems, which are working in-
dividually but systematically to in-
tegrate into one large information
system which can meet the demands
of all users from farmers to the agri-
cultural policy-makers. The inte-
grated agricultural information sys-
tem will be based on a database
management system, which col-
lects, processes and stores all the
relevant information at the provin-
cial level; decision support model
system, which produces the pro-
cessed information using databases;
and a communication (control) sys-
tem, which circulates information
within and between the systems and
eventually to the users.

Conclusion

In China, for historical reasons,
there has been a bias in the distribu-
tion of agricultural information re-
sources in regards to geographical
areas (for example the highly pro-
ductive eastern areas *vs*. mountain-
ous western areas), different sectors

and organisations (for example well
established university libraries *vs*
widely dispersed and ineffective in-
formation provision for farmers);
and bias towards the dissemination
of high-level scientific and techno-
logical information as against the
practical information for working
farmers.

For China, the rapid development
of the economy and the modernisa-
tion of agriculture are top priorities.
The following are long term objec-
tives:

- to rank as an advanced agricultural
  nation;

- to apply the latest technology to
  agriculture and integrated technol-
  ogy with traditional practices to
  form a technological structure with
  Chinese characteristics;

- to diversify rural economic sys-
  tem;

- to vigorously and effectively unify
  economic, social and environmen-
  tal aspects of the rural economy;
  and

- to produce a new generation of
  farmers with a better knowledge
  of science and management.

To realise these objectives, ag-
ricultural output and productivity
must first be improved. These can
only be achieved by adopting sound
policies, with the application of
advanced science and technology,
coupled with adequate physical in-
put. In this long term process, agri-
cultural information specialists can

play important roles as they provide linkages in provision and dissemination of scientific and technological information, and in popularisation of scientific and technological knowledge to rural communities.

There are urgent needs for strengthening local rural information services, the introduction of modern information and telecommunication technologies to reduce the isolation of the rural areas and to facilitate information transfer, and for the establishment of provincial agricultural information networks catering for the information needs of all user groups including those in the rural communities.

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QIAOQIAO ZHANG began her career with CAB International in 1991 where she was involved in the assessment of CABI's coverage of Chinese literature. She is currently CABI's project manager for the Asian Development Bank funded China Information Project.

XIAOLAN CHENG is with the Zhejiang Academy of Agricultural Sciences, Hangzhou, China.

CONTACT ADDRESS:

Qiaoqiao Zhang
CAB International
Wallingford, Oxon OX10 8DE
UNITED KINGDOM
Telephone: +44-1491-832111
Fax: +44-1491-833508
E-Mail: q.zhang@cabi.org

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